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# QUEENSLAND AGRICULTURAL JOURNAL

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1 SEPTEMBER, 1927.

PART 3.

## Event and Comment.

### The Governor's Speech.

ONE of the most important events of the month was the opening of Parliament on 24th August by his Excellency the Governor, Sir John Goodwin. There was much to interest agriculturists in his Speech, in the course of which reference was made to many of their industrial activities.

"The dairying industry," said the Governor, "continues to advance on the technical side, and this is evidenced by the considerable capital that is being devoted to the renovation or rebuilding of factories, with the consequent improvement of plant. The successes obtained by Queensland manufacturers in competition with other States and countries during the past few years have placed Queensland definitely in the forefront with the leading butter-manufacturing countries, while Queensland still continues to maintain its position as the premier cheese-producing State of the Commonwealth.

"The sugar manufactured from last season's crop amounted to 376,000 tons, the previous crop being 467,000 tons. As a result of this reduction in the output, a higher percentage of the sugar was consumed in Australia, and this fact, together with the enhanced price obtained for the exported surplus, enabled an average price of £24 10s. 10d. per ton to be paid to the producer. As a continuance of the policy



of safeguarding the interests of the producers of sugar, the crop for the current season has been acquired under the provisions of the Sugar Acquisition Act of 1915. It is anticipated that the yield of sugar in Queensland for the present season will be about 430,000 tons. In 1920 the area cultivated for cane was 162,619 acres, while to-day it is nearly 300,000 acres, and the number of growers of cane since 1920 has increased by 70 per cent.

“Considerable attention has lately been given to the utilisation of the by-products of the sugar industry, and, with the assistance of the Queensland Government, a power alcohol distillery has been established at Plane Creek, near Mackay, where molasses is now being turned into power spirit, and this factory will doubtless be followed by others.

“The manufacture of celotex from megasse, another by-product of the sugar industry, promises to develop into a most important industry in Queensland. It is estimated that the amount of dry megasse produced yearly by the Queensland sugar mills is nearly 500,000 tons, which would make an enormous quantity of celotex board. The board is lighter than timber, and it is especially suitable for tropical buildings. Thus megasse, hitherto burnt for fuel in the sugar mills, can become a highly valuable product of enormous benefit to the sugar industry.

“In practically every district,” continued His Excellency, “from the Southern coastal border to the Far North, good crops of maize were obtained, and the aggregate yield is estimated to reach 4,000,000 bushels of good quality grain.

“For the first time in the history of the cotton industry, the whole of the crop this year will be consumed within the Commonwealth. This condition is likely to continue and should result in the industry being placed on a profitable basis for the grower.

“The scourge of Bunchy Top in banana plants is still a subject of concern, but it is anticipated that the close application of the conditions imposed on infested areas, which are being carefully watched by departmental officers, will effect complete control of the disease.

“The policy of my advisers in encouraging and assisting primary producers to organise continues to meet with success.

“At the present time eleven-twelfths of the value of the agricultural products of Queensland are marketed through a co-operative system under the control of the producers themselves. It has been estimated that during the financial year that has just closed the value to the agriculturists of Queensland in the increased returns as a result of co-operatively controlled marketing exceeded £1,000,000 sterling.”

Other matters to which reference was made in the Speech included the Faculty of Agriculture, Settlement of the Mount Abundance, Upper Burnett, and Callide Valley lands, developmental roads in rural districts, the establishment of a butter factory at Silkwood, the Dawson Valley irrigation project, and the vigorous methods employed in pest eradication.

Among new measures forecast are—A Rural Fires Bill, a Land Acts Amendment Bill, Agricultural Townships Bill, a Wheat Pool Acts Amendment Bill, and a Fruit Cases Bill.

### Fostering Queensland Industries.

IN the course of a notable speech at the official opening of the Brisbane Show the Deputy Premier, Mr. Forgan Smith, emphasised that it was the duty and privilege of every Government to help to foster industry in every manner possible, but the impetus to make industrial operations a success must inevitably come from



those who were engaged in those industrial pursuits. He paid a tribute to the unselfish work being performed by the Royal National Association, which, from the point of view of service to the community, was performing a great work for Queensland. They often heard the remark, "That is near enough"; but nothing but the best was good enough for Queensland. To maintain the high standard of living that had been set in Australia in those industries which were the subject of international competition it was necessary that they should have the highest standard of efficiency and production. From this point of view wonderful things had been achieved in Queensland. In the sugar industry, for instance, Queensland made a ton of sugar out of less cane than any other country in the world. This was due to improvement on the farming and milling side. In 1914 the amount of cane to a ton of sugar was 9.20 tons, but the average now was  $7\frac{1}{2}$  tons. In conclusion, the Deputy Premier emphasised that the parliamentary standards should be high, and that its authority should be maintained. "Let us, as individuals," he concluded, "while demanding a high standard in Queensland and Australia, see to it that we, as citizens, each in his allotted sphere of activity, work to make Queensland what it should be."

### **"Undefeatable"—The Queensland Spirit.**

IN the course of a short Press interview in the ring at the recent Brisbane Show, the Governor, Sir John Goodwin, said that he was delighted with the wonderful horsemanship and jumping demonstrated in the Queensland Champion District Hunters' competition. "I wish," he added, "I could have that field in some of the hunting districts in England. It was a wonderful demonstration."

Discussing the Show results generally, the Governor said he was immensely pleased with the variety and extent of the exhibits. He and Lady Goodwin had spent several very pleasant days inspecting the several sections of the Show, and he hoped that next year he would be able to forego the whole of his public engagements so that he might devote his entire attention to the exhibition. "There is one thing," said his Excellency, "that impressed me very deeply, and that is that the people of Queensland, in spite of the uncertainty of the seasons, are undefeatable. Such a spirit and such co-operation must overcome all difficulties and promote solid national prosperity."

### **The Queensland Tropics—"Like being in Fairyland."**

EVERY year an increasing number of southerners come north seeking the sun, and the impressions of their visit are invariably appreciative. This is what a notable visitor, Reverend Dr. R. Scott West, Moderator-General of the Presbyterian Church in Australia, said at Toowoomba recently: He had been impressed with the unbounded hospitality of Queenslanders. It had been a real joy travelling up and down Queensland. Travelling in North Queensland was like being in fairyland. He believed that the scenery there was equal to anything in the world, and he had travelled a great deal and knew a good many countries.

Queenslanders had shown, he thought, a lack of enterprise in not advertising this wonderful country. He had also been impressed with the physique of the people and the beauty of the little children, and he had no doubt as the years went by that they would develop a virile race.

He had been delighted with the people of Cairns and Atherton, and had been impressed with the courage, heroism, and vision of the people in the face of adverse circumstances in that area in the Central West affected by a seasonal set-back.



# Bureau of Sugar Experiment Stations.

## ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS, Entomologist.

### White Ants Attacking Cane Sticks and Sets.

Damage caused by white ants consists in destruction by the worker and soldier forms of a community of (1) newly planted sets and young shoots arising from same, (2) invasion of the sets and growing cane-sticks from below ground level, or (3) ultimate removal of the entire internal cellular tissue of the sticks, thus reducing such canes to mere hollow tubes, nothing being left of them except the rind.

To control this pest on badly infested land, it is advisable to fumigate the soil with carbon bisulphide or paradichlorobenzene; applying  $\frac{1}{4}$ -oz. doses injected 18 inches apart, 6 inches from the plants, and at a depth about level with the sets.

When treating young plant cane be careful not to apply such fumigants closer than 6 inches from sets, and in the case of bisulphide direct the doses parallel to the cane rows, *not towards the plants*. The vermored "Pal Excelsior" soil injector has proved satisfactory in field work. Secondly, locate position of nest or termitarium if possible, in old stumps, roots, &c., chancing to have been left in the canefield, or in fallen or standing timber occurring close to headlands, and fumigate same when practicable with Shell benzine, Cyanogas, &c. Thirdly, smear poison bait ( $2\frac{1}{2}$  oz. sodium arsenite mixed with 1 quart of mill molasses) on infested fence posts, pieces of wood or cane, &c. (to act as poison baits on headlands or amongst affected cane plants). Fourthly, avoid planting sets obtained from termite-infested localities.

### How Growers Can Check the Weevil Borer.

During the cutting period one has a chance to locate the exact whereabouts of the cane beetle *Rhabdocnemis obscurus* on cane areas affected by this pest. The position of any infestations occurring perhaps for the first time should be carefully noted, and the Entomologist at Meringa Experiment Station advised without delay. Tachinid parasites of this weevil borer will be liberated by the Sugar Bureau free of cost on such affected cane land, on the condition that the grower concerned will agree to leave at least a quarter of an acre of badly bored cane for these parasites to breed in; this area should be allowed to remain uncut for three months or longer, and must on no account be burnt.

One cannot expect to successfully establish these useful parasites unless they be carefully looked after and given a chance to multiply. Indiscriminate burning of the cane in which they have commenced to breed is one of the chief causes of failure to secure the permanent benefit which should necessarily result from liberations of this tachinid fly.

### Protect Your Insect Friends.

Do not destroy the soil-frequenting larvæ of beneficial insects that happen to be parasitic or predaceous on cane-grubs. Some of the commonest of these may be easily recognised by the following brief descriptions and accompanying illustrations:—

(1) White, maggot-shaped inactive larvæ about an inch long, which when ploughed up are sometimes found attached to dead or dying cane grubs (Fig. 1). These spin cocoons (Fig. 2) from which emerge digger-wasp parasites.

(2) Dark-brown cocoons, from  $\frac{1}{4}$  to  $1\frac{1}{2}$  inch long, composed of silk hardened to the stiffness of paper (Fig. 2). These are often exposed by the plough, and contain either male or female digger-wasps (Fig. 3).

(3) Shining white maggots, about  $1\frac{1}{2}$  inches in length, but more slender than those of Fig. 1, and able to tunnel with ease through soil by means of a pointed beak (Fig. 4). These predaceous larvæ of robber-flies (Asilidæ) pierce and suck the life juices of various cane grubs.

(4) Large flattened wireworms (Fig. 5), from 1 to 2 inches or more long, having yellowish-brown shining bodies and six small legs close to the head end. These slippery, very active creatures remain in the ground two years or longer before transforming into beetles. They are inveterate enemies of cane grubs, seizing them with their sharp sickle-shaped jaws and then cutting deeply into the body and greedily imbibing its succulent contents.



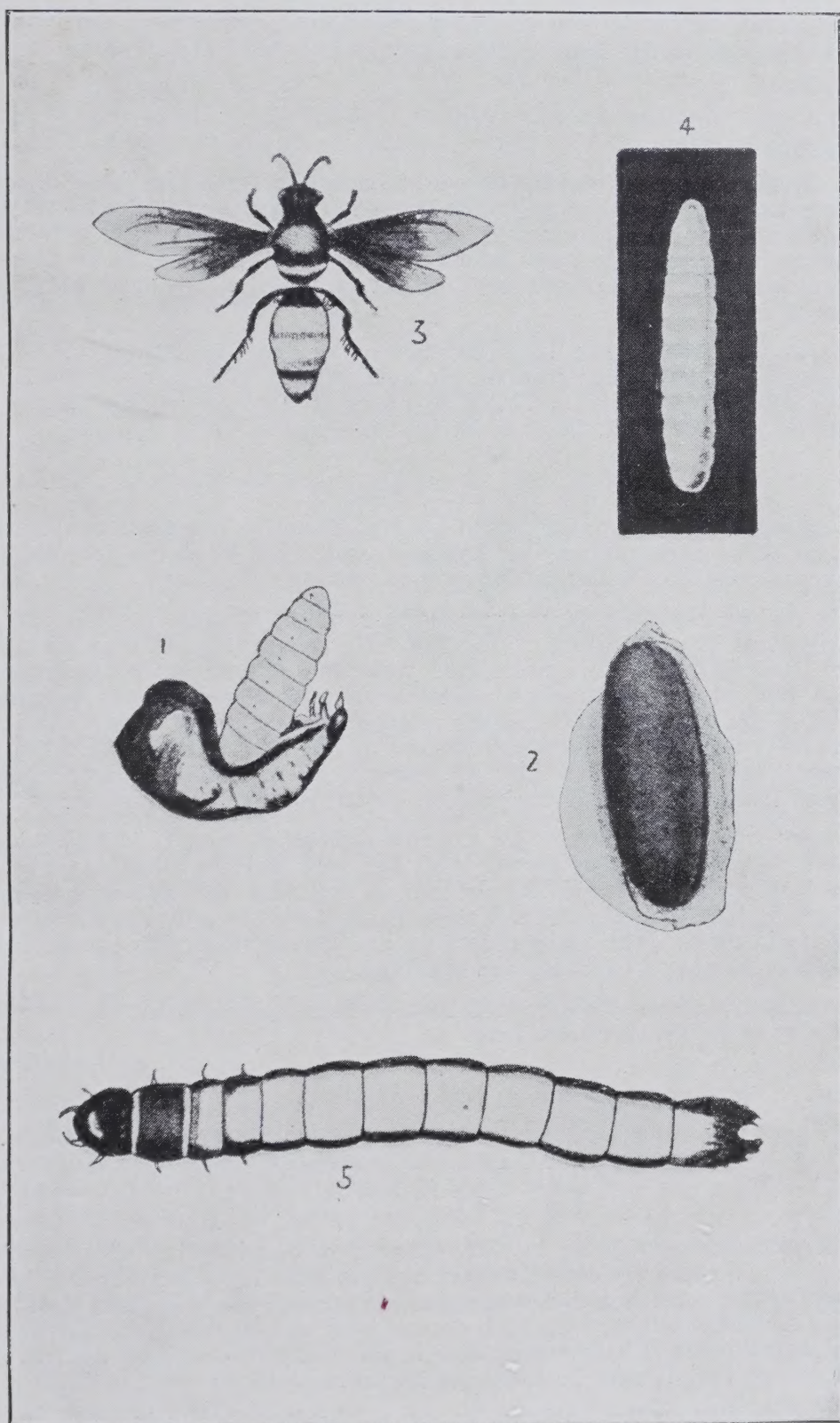


PLATE 55.

Fig. 1.—Mature maggot of digger-wasp attached to shrunken body cane grub.

Fig. 2.—Cocoon of digger-wasp, spun by maggot.

Fig. 3.—Digger-wasp (*Campsomeris tasmaniensis*).

Fig. 4.—Soil-frequenting maggot of Robber Fly; predaceous on cane grubs.

Fig. 5.—Soil-frequenting larva of elaterid beetle; predaceous on cane grubs.



## TOP ROT IN SUGAR-CANE.

*The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following notes (8th August, 1927) from the Assistant Pathologist, Mr. E. J. F. Wood:—*

### Investigations to Date.

This disease, which for a long time was known as Burdekin Top Rot, or simply as Burdekin Rot, has caused considerable losses to the farmers of the Lower Burdekin district, and as yet little information of a definite nature has been obtained. This is an attempt to present the facts which are known at the present time, as well as certain theories which the farmers have put forward, and a few ideas which commend themselves to me.

Hitherto the trouble has been practically confined to Badila (N.G. 15), but smaller occurrences have been seen by the author in D. 1135 (not on the Burdekin), M. 1900 Seedling, and rarely in H.Q. 426, where it was very slight. Many farmers have observed it in Rose Bamboo and Striped Singapore.

### Cause.

The casual organism was suggested by Mr. Tryon as a septate fungus which he identified on mycelial characters as a *Pythium*, and which he stated attacked the roots of the cane, the Top Rot being, in his opinion, merely subsidiary.

At the end of 1925, Mr. W. Cottrell-Dormer, of the Bureau, while in Ayr, carried out investigations as to the cause of Top Rot. He has ascertained that the red streaks noticed on the cane leaves are associated with Top Rot as an earlier stage of the latter and that these red-streaked portions contain bacteria. He cultured these bacteria, and by infection of healthy plants with material from these cultures produced the typical red streaks, and later Top Rot as it occurs naturally. He has thus shown that Top Rot is caused by bacteria as the active agent, though there still remains the larger part of the problem—what are the primary factors?

His work was carried out under extreme difficulties, and it is highly creditable to him that he achieved such results with the very limited means at his disposal. Owing to lack of time he did not succeed in isolating the causative organism in pure culture, so that its cultural characteristics still remain a mystery, and we do not yet know its identity. The main object of his investigation, the production of the disease with a culture of bacteria, was obtained.

The symptoms of the disease have been discussed in his work on the subject, so it is unnecessary to mention them here.

### Seed Cane.

It has been established beyond doubt that infected plants do not produce infected cane in the resulting crop, and that cane from clean fields will often show up infected in the plant crop. Infected plant cane may give rise to healthy ratoons and vice versa.

One experiment conducted by Mr. Tower, of Jarvisfield, will be sufficient to illustrate this. Warned by some farmers against planting diseased sets, he selected some diseased and some healthy cane from different fields and planted them beside each other. In the resulting crop both showed equal amounts of Top Rot. Of course, secondary infection could have taken place in this case, but so many other experiments support this one that it may be taken as typical.

Again, a farmer on the Anabran branch procured healthy Badila in 1920, and planted it on virgin soil. The resultant crop was about 5 per cent. Top Rot. Next year Top Rot was bad in patches, which died right out. Since then the cane has been healthy till this year, when some Badila plant on new soil is showing bad patches of Top Rot. Farmers all over the district have quoted similar cases.

### Conditions of Cultivation on the Burdekin.

As Top Rot is epidemic only on the Burdekin, it will be well to recapitulate the methods of cultivation there, as it seems probable that they have some bearing on the trouble.

As a rule there is a definite wet season at the beginning of the year, with dry weather except for a few isolated rains during the year. It is therefore necessary to water the cane during growth, and this is done by water pumped on to the fields



by means of spear pumps. This is done at intervals, and often when rain is expected the irrigation is deferred. Sometimes the rain does not come, and the cane is badly checked. On the other hand, irrigation may be followed by a storm and the ground flooded. So that these conditions are rather unnatural and must be considered in connection with the disease.

It is unusual to ratoon the cane, and plant crops are the rule. On some places first, and on a few second and third ratoons are grown.

In this connection it must be noted that although the cane may be regularly watered, the atmosphere remains dry, and this may be playing a big part in the conditions controlling Top Rot.

### Losses Due to the Disease.

These are at times heavy. A crop estimated at 32 tons per acre, grown at Macdesme, became infected and cut 15 tons. Another estimated at 28 tons cut 14 tons. There are farms on the Burdekin which rarely, if ever, are affected, and on many farms infection seems to occur on the same block to a greater extent than on other adjacent blocks.

The farmers are unanimous in stating that they think the trouble to be due to seasonal variations, for in some years there is hardly any loss due to Top Rot, while the next year may show a general infection throughout the district. This appears to point to the fact that there are a number of complex factors involved, as no simple relation between season and disease can be found. A general hypothesis based on the evidence obtained will be given, but it must be remembered that it is probable that it will have to be modified as other facts come to light.

### Distribution.

The whole of the Burdekin district is affected to some extent, Badila being the main variety affected. As most of the land is too rich for other canes, which grow rank and lodge, this is serious, and it is hoped that the South Johnstone seedlings will show some resistance to Top Rot and will be able to be used to replace Badila.

Mr. Gibson reports that Top Rot is occasioning some damage at Freshwater, and this is of interest, as it may help to throw more light on the trouble.

Top Rot occurred on the Experiment Station at Mackay after the heavy rains that followed the 1902 drought and wiped out half the Rose Bamboo on the place (I quote "The Director"). It has also occurred on the Herbert, and I have seen signs at Beenleigh during heavy rains following a drought.

### Period of Infection.

This is roughly from November to the end of February, and there are two stages of infection:—

- (1) When the plant is just beginning to make cane the outer leaves show red streaks, and soon the centre rots. This usually occurs in the leader or first shoot and causes little loss, for the cane stools out from below, and as there are about fifty shoots in each stool, of which only about twenty ever come to maturity, the loss is not noticeable.
- (2) The other occurs when there is about 3 to 4 ft. of cane. The red streaks appear, the top dies and rots, and the cane usually side-shoots and may sucker. The cane is healthy below the localised rotted portion and is millable, and can be used for plants.

### Possible Theories as to the Immediate Cause.

It has been suggested that the disease is due to the running out of Badila, but this theory is disproved by the fact that the comparatively recently introduced Oba Badila shows Top Rot, and in the Tableland Badila many farmers have reported exceptionally heavy losses. Also the appearance of the trouble in E.K. 28 and M. 1900 Seedling and Q. 813 goes against this theory.

The evidence given above shows that Top Rot is a disease markedly different from the type of disease known as Vascular Disease, which includes Gum and Leaf Scald, likewise bacterial diseases, so that seed selection, the main control measure for these, will not apply in this case.

Another peculiar thing is that from the centre of infection the rot proceeds only for a few joints down the stem and the rest of the stick remains healthy.



Mr. Cottrell-Dormer has given us a bacterial origin for Top Rot, and it remains for us to clear up the factors which control the virulence of this parasite, and also to gain some further knowledge of its habits.

From the attacks in other places we must presuppose the presence of the bacterium over a wide area, and that it requires certain attendant factors for its appearance in epidemic proportions. There is apparently either a case of very balanced parasitism or of a facultative parasitism by an organism which is usually harmless. This will have to be determined in the laboratory, and in the course of these investigations we may be able to derive the source of the organism.

For this there are several possibilities—

- (1) That they exist in the soil and are carried up with the cane.
- (2) That they exist in the water used for irrigation.
- (3) That they are borne by the wind or by insects from plant to plant.

None of these possibilities have been disproved, but No. 2 is unlikely, as there is no irrigation in other districts, and owing to the fact that the young leaves are rarely covered with water during irrigation. Cultural work will perhaps discriminate between these points.

We have, again, a question of resistance and susceptibility, as Badila is susceptible and H.Q. 426 tolerably resistant. Some factor such as the shape of the leaves or their texture may be at work here.

Many farmers hold the opinion that it is a seasonal trouble, but it is peculiar that in the same farm some fields will be affected and others not; then in the next year the uninfected fields may show infection, though it seems, as mentioned above, that certain paddocks show bad infection from year to year.

It seems a plausible theory that rapid growth of a tender growing point after a check allows the bacteria, ready in the crevices of the spindle, to obtain a footing.

The farmers have been asked to give data and to try to clear this point. The case at Mackay and that at Beenleigh fit in with this theory, and many farmers concur with it.

The check may be produced in two ways on the Burdekin—

- (1) By rains following a drought, or a period in which the cane has not been watered.
- (2) By heavy irrigation after a time when the irrigation has been light or after the cane has begun to wilt. It was ascertained, in conversation with the cane inspector of Pioneer, that on the farms which water regularly the outbreaks of Top Rot are at a minimum.

The following data were obtained from Mr. Munro, of the State Farm at Home Hill, who is, in addition, carrying out experiments in order to supplement them:—

FIELD No. 6—Season 1926-27. Area, 5.7 acres.

Month.	Gallons of water applied.				Rainfall in inches.			
June, 1926	..	..	..	680,000	..	..	..	0
July	..	..	..	40,000	..	..	..	0
August	..	..	..	568,000	..	..	..	0
September	..	..	..	0	..	..	..	4.42
October	..	..	..	160,000	..	..	..	0
November	..	..	..	60,000	..	..	..	0.07
December	..	..	..	815,000	..	..	..	3.26
January, 1927	..	..	..	10,000	..	..	..	17.58
February	..	..	..	0	..	..	..	9.73
March	..	..	..	356,000	..	..	..	1.52
April	..	..	..	278,000	..	..	..	0
May	..	..	..	577,000	..	..	..	0
June	..	..	..	0	..	..	..	4.82
July	..	..	..	0	..	..	..	2.74

Top Rot appeared in December and January—i.e., after a watering of 60,000 gallons and .07 in. of rain, followed by 815,000 gallons and 3.26 in.

Here we have definite evidence of a check followed by a drenching and the coincident appearance of Top Rot. As, however, this is an isolated case, care must



be taken against drawing any definite conclusions from it, but it certainly seems to fit in with the general hypothesis enunciated above. It is hoped that more data of the same nature will be established at a later date. Any farmers who can supplement these figures are requested to do so.

The farmers on the Burdekin are to be circularised and asked to give a report on a printed form on the times of watering, and as far as possible the amounts of water used, for it is recognised that it is not possible to give an even distribution of water on a field, except in a few cases and in the case of small fields. This will take at least a year to accumulate, but it is hoped that they will prove of value from the practical standpoint, or, at any rate, till the theoretical can be taken up and followed to its conclusion.

## CANE PEST COMBAT AND CONTROL.

*The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has made available the following report from 15th July to 14th August, from the Entomologist at Meringa, near Cairns, Mr. E. Jarvis, in connection with the control of cane beetles.*

### Direction of Flight Affected by Topographical Conditions.

Judging by observations made by the writer during 1915 to 1918 it appears very probable that the character of the forest land on both sides of the Mulgrave River, extending from Gordonvale to Deeral, is probably responsible for the invasion of our district by the greyback cockchafer (*Lepidoderma albohirtum*).

Infestation of cane lands around the Mulgrave, for instance, was apparently affected by beetles that did not originate in that locality, but migrated there from extensive breeding grounds lying to the south of Aloomba, between the Malbon Thompson Range and the mountain chain which terminates on the north in Walsh's Pyramid.

Fully one-third of this area of about eighty square miles consists of reserved land, in the vicinity of Tringilburra and Fishery Creeks, which supports patches of virgin scrub and is for the most part uncleared.

Now, the topography of the country in question chances, unfortunately, to favour a north-westerly migration of these beetles, as owing to the position of the Malbon Thompson and Pyramid Ranges the south-east trade wind—being unobstructed in its course—naturally offers every facility for the gradual transportation of quantities of greybacks breeding throughout this vast area towards Gordonvale and adjacent sugar-growing localities.

Flight in an easterly or westerly direction being opposed by mountain barriers, these beetles, after skirting along the base of the ranges, would tend to arrive in greatest numbers at Walsh's Pyramid, from which point the cane lands of Aloomba are only about 1½ mile distant, and in the direct line of migration.

Invasion of this district appears to have followed as a matter of course, about the year 1895, and at first the pest was satisfied to breed among the roots of native food-plants; its grubs, as a matter of fact, having been noticed to occur very plentifully under "blady grass" (*Imperata arundinacea*), which at that time covered large spaces of forest land around Aloomba and Behana.

### Influences Responsible for Migration.

The natural laws which govern the migration of certain classes of insects are too varied and complex to deal with in a report of this kind. Such insects, however, including our greyback cane-beetle (when chancing to multiply abnormally over restricted areas) being instinctively aware of the increased danger that invariably threatens crowded numbers, generally seek to migrate when possible in order to ensure wider distribution of their eggs, and establishment of their grubs or larvæ in different classes of soil, thereby reducing the percentage of mortality likely to be caused by birds, parasitic insects, and other natural enemies.

As pointed out in my last monthly report the cockchafer beetle in question, although of somewhat bulky proportions, is well adapted structurally for aerial transportation; in short, it seems likely that its occurrence locally in concentrated numbers should be attributed mainly to influences of a meteorological nature operating in conjunction with such factors as (1) the mechanical condition of soil; (2) character and disposition of timber or feeding trees; (3) the geographical situation of our high lands and mountain ranges, &c.



Growers should bear in mind that the migratory flight described above, has nothing to do with that of the egg-laden females occurring about a couple of weeks later. In the former case—which may be considered as being an irresponsible dispersion or exodus towards fresh breeding grounds—the newly emerged beetles of minimum weight are able to travel considerable distances; whereas the flight, or in many cases invasion of cane lands by mature females seeking to deposit their eggs, must necessarily be far more restricted. An important point, often lost sight of, is the fact that there is always a danger after such invasion that the affected locality may chance to prove a suitable breeding place for the pest, in the event of which it may subsequently become permanently grub-infested. On the other hand, incursions of a temporary nature may take place, owing to the position of certain feeding-trees or the occurrence of high land in the near vicinity of a plantation happening to arrest the flight of gravid females. In such cases, however, these beetles may not breed there the following season, but pass on to fresh fields.

Reflection upon the significance of the above mentioned influences affecting the aerial movements of our greyback cockchafer naturally leads one to the consideration of the question of its food-plants in relation to grub attack.

### When to Destroy Feeding-trees of the Beetle.

In the event of a belt or clumps of timber containing food-plants of the beetle chancing to occur in the midst of, or to separate two adjacent plantations, and to lie in a south-westerly situation about a mile from the southern headland, such trees should be cut down. Similarly, when either one or opposite sides of an area of cane land happen to run in a south-east direction and be closely bounded by forest country, it is often advisable to cut out all feeding-trees, &c., growing near such headlands to a distance of about half a mile from the nearest rows of cane.

On the other hand, when the southern edge of a canefield is bounded closely by forest land extending far to the southward it is not advisable to clear a belt of timber back from such headlands, or to cut down the feeding-trees.

Should grubs occur over an area of cane land chancing to be more or less surrounded on all quarters except the south by timbered mountain ranges, destruction of the food-plants of this beetle would, if practicable, not only entail considerable labour and expense, but be likely in many cases to prove ineffectual as a control measure. Such cul-de-sacs or small pockets usually become grub-affected in the first place as a result of the arrival of beetles migrating from the south-east, which are forced to come to rest upon timber fringing the base of these ranges. Finding the situation suitable for breeding purposes, and that further progression towards the north, east, and west is more or less obstructed by mountainous country, they generally become established in such localities and regularly damage the cane each season.

In permanent infestations of this kind the best plan is to prevent excessive multiplication of the beetles by collecting them during the so-called flying period, either from native food-plants or from trap-trees grown especially for this purpose, and by picking up the grubs during the course of cultural operations.

By exercising common-sense methods of this sort it should be possible on such cane areas to ultimately reduce the grub pest to harmless proportions, seeing that the fields are practically closed from further invasion from all quarters but the south.

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*The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (23rd July, 1927) from the Entomologist at Meringa, near Cairns (Mr. E. Jarvis), dealing with (1) various influences affecting the numerical increase of the greyback cockchafer during the period of its aerial existence; and (2) activities of the Meringa Experiment Station for the past month, June to July, 1927.*

### THE GREYBACK COCKCHAFER.

#### (1) Hints on Control Derived from Study of the Organs of Flight.

Our canegrowers have often displayed curiosity regarding the probable range of flight of our principal cane beetle, being anxious, perhaps, at times to satisfy themselves that no danger of grub-infestation need be feared from the presence of belts of timber chancing to occur in the vicinity of their cane land, which might contain feeding-trees of the beetles.

Egg-laden females of *albohirtum*, however, probably seldom fly, at a single stretch before coming to rest, farther than about one-half to three-quarters of a mile;



and should obstacles, such as high ground (volcanic ridges) or well-grown ratoon or standover crops of cane be encountered in their line of flight the beetles, instead of continuing on the wing, are far more likely to remain and oviposit in such situations. In the event of a plantation of young cane from 6 to 12 inches high happening to lie between them and a block of standover cane they will generally pass over the former and come to rest amongst the older mature crop.

Evidence of such selection is not uncommonly met with, and doubtless affords an explanation at times as to the reason why (some months later) one notices the cane on certain areas succumb entirely to grub injury, while that alongside, divided from it by only a few feet and growing on the same land, remains quite free from attack.

Up to the present no experiments on an extensive scale have been undertaken by us to determine the average distance our greyback is able to travel. The question, after all, is not one of great economic importance, and can be approximately decided without having recourse to experiments which would necessarily be of a costly nature.

With regard to the flight of the female when ready to oviposit, we may reasonably assume that the distance it would be likely to fly would be much the same as that traversed under similar circumstances by the common European cockchafer, *Melolontha (vulgaris) melolontha*.

### Queensland and European Cockchafers Compared.

This latter beetle, *M. melolontha*, which is similar in size to our own *albohirtum* (1½ inch long), and belongs to the same sub-family *Melolonthidæ*, is of a light-brown colour with a series of little white triangular marks along the sides of the body. (See Figs 1 and 3 of this species and its grub on the accompanying plate.)

So closely is this European insect related to our own greyback cockchafer, that, while the latter species (as observed by the writer during the last twelve years) lives only three or four weeks, we find that the adult *Melolontha melolontha* (according to Labitte) lives for thirty-one days; so that the longevity of these two cockchafers during their aerial existence is practically the same. It is interesting to note that in Germany experiments have demonstrated that *M. melolontha* is unable to fly a greater distance than 1,100 to 1,650 yards before coming to the ground.

Judging by the scanty data obtained by us in this connection it appears probable, therefore, as already mentioned, that the above distance would be likely to apply also to the flight of egg-laden females of our own cockchafer, *albohirtum*.

### Record Capture of 15,000 Tons of Cockchafers.

It should be mentioned, as a further illustration of the similarity of habit between the two species of beetles in question, that in 1866 the authorities of the Seine Inferior (as reported by Edward Step, F.L.S.) estimated the loss to the growers from the grubs of *melolontha* at about £786,000. In Saxony, two years later, 15,000 tons of the beetles were collected and paid for, and it was found that the total number thus destroyed was not fewer than 1,500,000,000 of cockchafers. Some idea of such a vast number may be realised from the fact that these beetles, if placed end to end in close contact, would be sufficient to encircle the entire world in an unbroken line around its circumference at the equator, which is 24,000 miles; and there would still remain enough additional beetles to extend this distance for another 4,000 miles if needs be.

### We Must Protect our Insectivorous Birds.

The chief reason for British immunity during most seasons from such serious grub damage as occurs on the European continent, is to be found, it is stated, in the protection and love manifested by English people for the birds which help to keep down the numbers of these chafers. Queensland growers would do well to cultivate a similar regard for the numerous species of birds which help so greatly to thin the ranks of our most formidable beetle pest.

In England, owls, nightjars, and bats destroy great numbers of cockchafers, and it is said that starlings may be observed at the time when these beetles are emerging from the soil watching for them to crawl up into daylight so that they might capture and eat them. Rooks, on the other hand, do not wait for development of the beetle condition, but are said to plunge their bills into the ground and drag out the mature grubs.



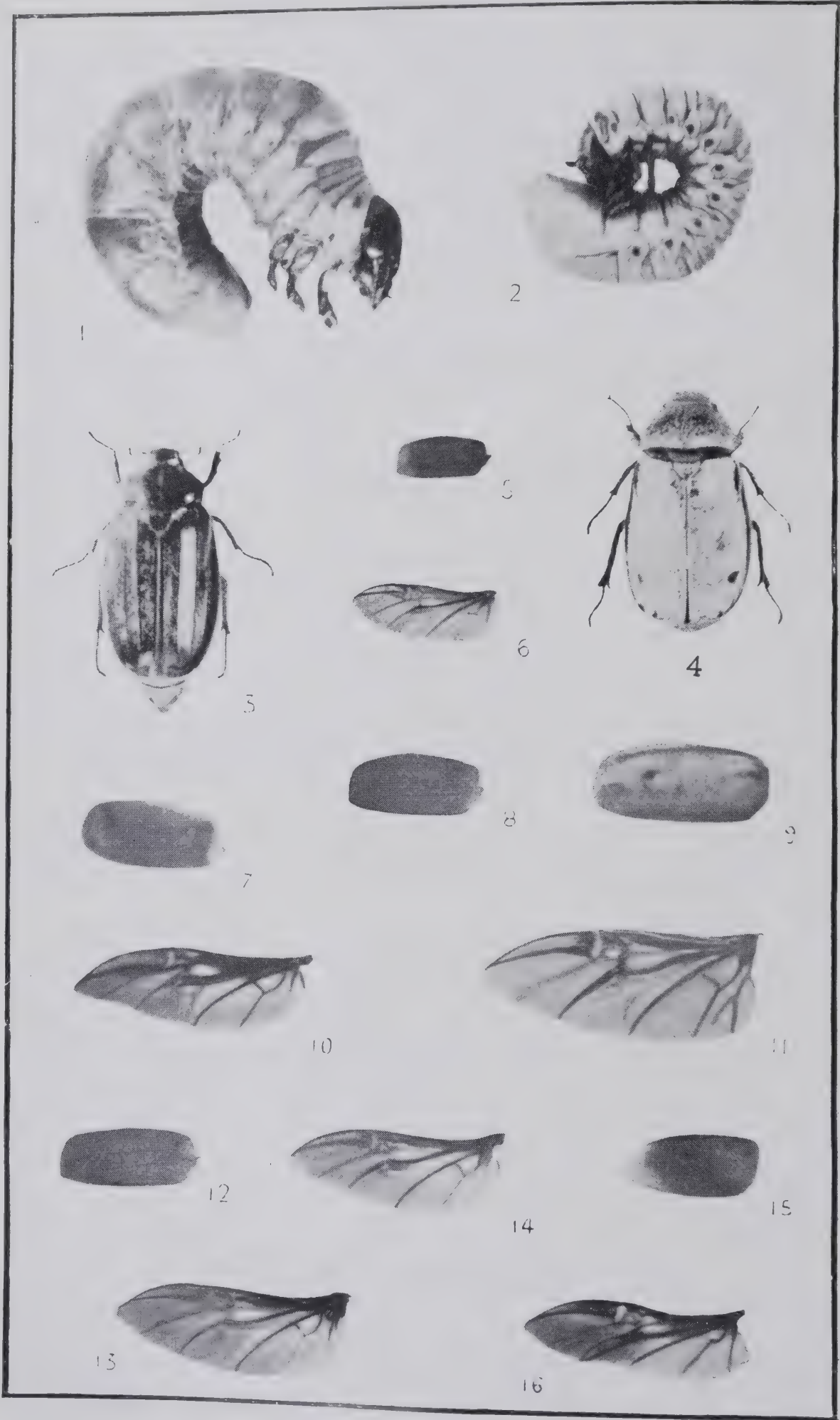


PLATE 56.

THE EUROPEAN COCKCHAFER COMPARED WITH OUR QUEENSLAND "GREYBACK,"  
TOGETHER WITH WINGS AND ELYTRA OF OUR CHIEF CANE BEETLES.

(For description of plate, see page 215.)



**Powers of Flight Dependent on Structure of Exo-Skeleton, &c.**

Special attention has been given by the writer to the external anatomy of our greyback cockchafer, which seems, indeed, to have been specially fitted by nature for wide dissemination or aerial transportation. In addition to exceptional lightness in weight, careful provision has been made for periods of extended flight; the wing-cases of elytra (Fig. 9 on plate) which are unusually light in proportion to their size, being deeply concave below, so that while the beetle is using its powerful wings its elytra project laterally, parachute-like from each side of the body, thus aiding the insect to maintain a steady course, and also giving it buoyancy.

A greyback beetle weighs little more than  $1\frac{1}{2}$  scruples when alive, and a dried specimen only 10 grains ( $\frac{1}{4}$  scruple).

Although *Anoplognathus boisduvali* turns the scale at 7 grains (a dried specimen) and possesses but two-thirds of the bulk of the latter insect, the wing surface of *albohirtum* is 836 sq. mm., and that of *boisduvali* 450 sq. mm. (much smaller proportionally than in *albohirtum*).

By comparing the wings and elytra of our scarabæid cane beetles (shown on the plate) it will be noticed that *Lepidiota consobrina* Gir. comes next in size to *albohirtum*, with a wing surface of 750 sq. mm., its body weighing a little less than that of the greyback.

*Lepidiota caudata* (Figs. 7 and 10) is apparently more fitted for aerial progression than *L. consobrina*, being lighter than that insect in proportion to its bulk, while possessing also broader elytra, and nearly the same wing expanse.

*Lepidiota frenchi* is just half the weight of *albohirtum*, but has a superficial wing measurement of 540 sq. mm., which happens to be greater in proportion to its bulk than that of the greyback. Owing to its erratic aerial movements, however, which consist, during the mating period, of short irregular flights in different directions, *frenchi* cannot be considered as being a migratory beetle although apparently enjoying a fairly wide range of distribution.

**(2) Activities in Connection with Experimental Work.**

It is regrettable to state that, owing to drought conditions having delayed planting up of our Meringa experiment plots, a decent strike was not secured until the beginning of February. Growth of the young shoots from deeply-planted sets was severely checked by the cyclone and flood rains, occurring on the 9th and 14th of February, respectively, which filled the planting furrows, nearly burying the tender shoots, and leaving the surface of the ground as uniformly level as a table. Further trouble was subsequently caused by stray horses getting into the selection on which these plots are situated—probably through portions of boundary fences that had been damaged by the cyclone—and eating down the young cane.

Despite such unfavourable conditions, however, two of the test plots have given encouraging results, viz.—that treated with “Chlorocide B”; and the one fumigated with paradichlor., applied by horse power. Both these experiments are well worth repeating next season. The results of other fumigants tested, such as “Chlorocide A,” Carbosyl, calcium cyanide, &c., were rendered inconclusive owing to the various causes above mentioned.

**REFERENCE TO PLATE.**

- Fig. 1.—Grub of *Melolontha melolontha* L. European Chafer, about  $1\frac{1}{2}$  times natural size.  
 Fig. 2.—Grub of *Lepidoderma albohirtum* Waterh. Queensland “Greyback” Cockchafer, natural size.  
 Fig. 3.—*Melolontha melolontha* L., natural size.  
 Fig. 4.—*Lepidoderma albohirtum*, natural size.  
 Fig. 5.—Elytron (wing case) of *Lepidiota rothei* Blkb., natural size.  
 Fig. 6.—Wing of same, natural size.  
 Fig. 7.—Elytron of *Lepidiota caudata* Blkb., natural size.  
 Fig. 8.—Elytron of *Lepidiota frenchi* Blkb., natural size.  
 Fig. 9.—Elytron of greyback cane beetle, natural size.  
 Fig. 10.—Wing of *Lepidiota caudata*, natural size.  
 Fig. 11.—Wing of greyback cane beetle, natural size.  
 Fig. 12.—Elytron of *Lepidiota consobrina* Gir., natural size.  
 Fig. 13.—Wing of same, natural size.  
 Fig. 14.—Wing of *Lepidiota frenchi* Blkb., natural size.  
 Fig. 15.—Elytron of *Anoplognathus boisduvali*, natural size.  
 Fig. 16.—Wing of *Anoplognathus boisduvali* Boisd., natural size.



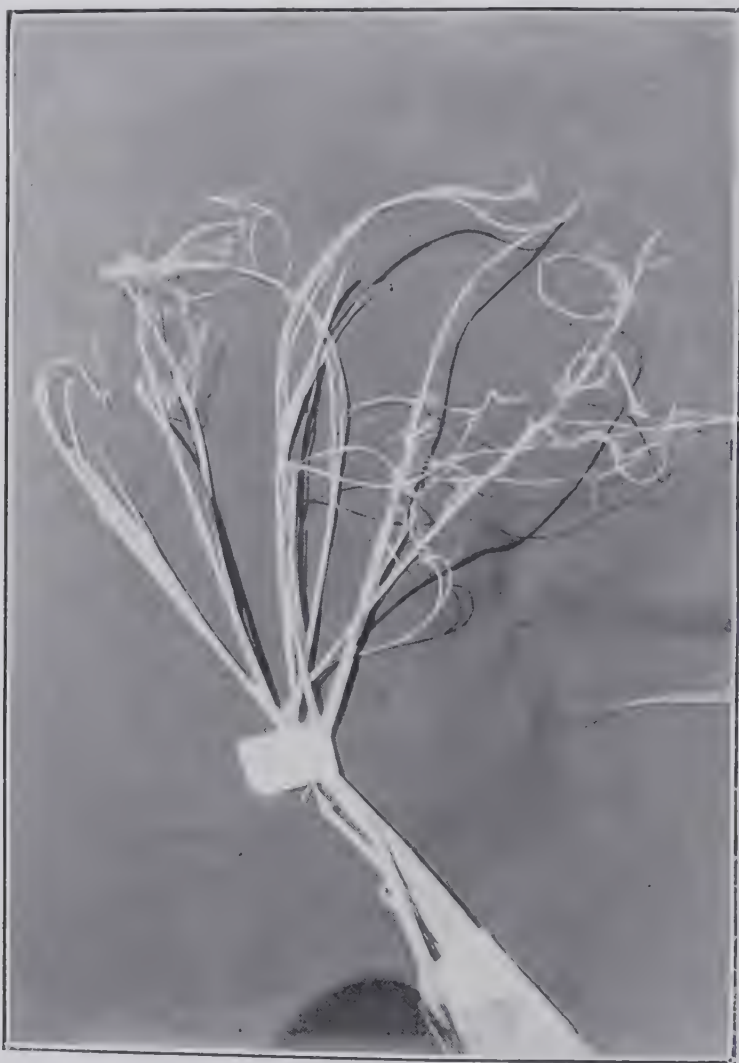
**CANE PESTS AND DISEASES.**

*The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report from the Assistant Pathologist, Mr. E. J. F. Wood, B.Sc., for July-August on the Ayr and Burdekin district.*

**BURDEKIN.**

On the Burdekin, two diseases are startlingly prevalent—Top Rot and Leaf Stripe. The former affects Clark's Seedling and Badila, mainly the latter variety, and the latter B. 208.

The disease known as "B. 208 disease" is in reality Leaf Stripe, and is a very serious matter. There is no denying that the days of this variety in this district are numbered, for on the majority of the farms the B. 208 is affected. Moreover,



*Photo.: E. J. Ferguson Wood*

PLATE 57 (Fig. 1).—A LATE STAGE OF LEAF STRIPE.

Note the thin nature of the stick, the shredded leaves which are practically dead and shrivelled.

the disease is spreading into Gern, Badila, and other varieties, and unless something is done the position will become acute. All the advice that I can give to the farmers is to plough out the B. 208 in the district as soon as it is harvested, and to refrain from planting any of it. Such as is planted should be got rid of at the next crushing. With the presence in the district of such good canes as E.K. 28, Q. 813, Gern, and H.Q. 426, there is no excuse for the propagation of such a notoriously susceptible cane as B. 208. It will not come hardly on any farmer to discard this cane, which can only serve as a source of infection to the other and better canes, and may in time cause all the varieties in the district to be infected—a sad state of affairs.



There is hardly any need for me to give the symptoms of the trouble, as it is well known to most farmers. But, as there are some who may not know it, they are:—

An elongation of the stick affected. These long sticks can be identified easily; in fact, I have picked them out while riding along a road on a motor cycle at dusk. They will have stunted and dying tops, and the leaves will shred up into strands.

Examination of the leaf will show a series of whitish to yellowish stripes, which turn brown on the older leaves. These on the backs of the leaves show a white mould which consists of millions of minute spores or fruit, about 1/1,000 the size of a pin's head. It is an easy matter for these to be carried by a wind for considerable distances, and this is how the disease travels from an infected field. Another source



*Photo.: E. J. Ferguson Wood.*

PLATE 58 (Fig. 2).—LEAF STRIPED AND HEALTHY CANE.

The two sticks are the same age. The one on the left is diseased, and shows the extreme elongation, and cancered nature of the stem, the sparse leaves, which are beginning to shred. The one to the right is normal, with green healthy top, and full stick of normal length.

of infection is the planting of diseased cane, and to this is probably due the fact that B. 208 often strikes badly, for one would not expect badly diseased sticks to grow.

If you have the disease in other varieties, it will pay to dig out the diseased stools, and on no account to plant them.

With regard to Top Rot, this disease has been shown by Mr. Cottrell Dormer, of this Bureau, to be due to bacteria, and it is strongly suspected that bacterial entry is effected subsequent to a check in the growth of the cane. This would



account for the fact that on some farms and during some seasons the disease does not occur, and also for the fact that it occurs only in some sticks in a stool. The prevalence of the disease in Badila may be due to some peculiar formation of the leaves or some such varietal peculiarity.

The only advice that I can offer the farmer concerning this trouble is to try and arrange that the water is applied to the fields regularly, and to minimise all checks to the growth of the cane, as all the evidence that I have been able to obtain seems to point to the fact that the disease occurs in young, tender tops growing too weakly after a check due to drought. Some data has been collected, and the farmers are to be asked to supplement it as far as possible. It is hoped that they will realise the necessity and do so.

Mosaic disease is present on both sides of the Burdekin, to a limited extent it is true, but owing to the rapidity with which the disease spreads, every effort should



*Photo.: E. J. Ferguson Wood.]*

PLATE 59 (Fig. 3)—LEAF STRIPE IN POMPEY (7R. 428).

Note that the diseased cane marked "X" is much longer than the rest of the crop.

be made to check the trouble before it becomes epidemic. It is occurring in E.K. 1, Clark's Seedling (H.Q. 426), and in Badila and Tableland Badila in limited areas; but the worst infection and that most to be feared is the infection of B.208. It was partly owing to Mosaic that this variety was discarded on the Herbert River. On many farms this disease was noticed in sorghum, Sudan grass, and Guinea grass, and also in corn. This tends to prove that it is dangerous to grow corn and sorghum, and that all headlands should be kept clean from the grasses which can carry infection from cane to cane. It is also noteworthy that these pests were worst on the farms that were showing Mosaic infection in the cane. This is no idle theory,



for it has been proved over and over again in Queensland, while Louisiana is an extreme example.

The farmers on the Burdekin have the idea that their district is almost free from disease, and tend to disregard Mosaic and Leaf Stripe, but I have not found the area nearly as free as some other districts.

In the Ayrdale and Maidavale areas Mosaic and Leaf Stripe are present, the latter being serious in some cases.

Pioneer, Brandon, and Colevale are very clean, but Top Rot and Leaf Stripe are present to some extent.

Jarvisfield and Macdesme have Top Rot on most of the farms, and it is doing considerable damage this year.

Rita Island and the Inkerman area are the most free of disease, and farmers can fairly safely get seed from these.

Airdmillan and Kalamia have Leaf Stripe in B. 208 and 7 R. 428 (Pompey).

Along the river on the Home Hill side Mosaic and Leaf Stripe and Top Rot are bad in patches, and the farmers are warned that B. 208 is a dangerous cane for both these diseases. It is also a hard cane to grow, and side-shoots badly; so that, despite its high density and good tonnage under favourable circumstances, the farmers would probably find, if they went into the matter, that it also costs more to grow than the other canes. Mosaic causes very great stunting in growth in this variety, and considerable losses may be expected if the disease spreads.

With regard to varieties, Badila is resistant to Mosaic and Leaf Stripe, E.K. 28 possesses tolerable resistance, and these can be grown on the rich river soils. For the forest soils, Q. 813 is strongly recommended as a resistant variety, and E.K. 28 is also a good cropping cane on poorer classes of soil. The varieties Korpi, Nanemo, and Oramboo are now in the district, and several good crops of the first mentioned are being grown. The resistance of this variety has still to be tested.

### GIRU.

Many of the remarks that have been made with regard to the Burdekin apply here, especially with regard to B. 208. This cane is not, in my opinion, worth the trouble taken to grow it, and I feel sure that a crop of Clark's Seedling will be found to give better returns over a period. It is almost impossible to get a satisfactory ratoon crop of B. 208 on the Houghton, and it is the ratoon crop that pays. Even the plant crop, if it receives a check, side-shoots badly and spoils the crop. Moreover, it is almost impossible to grow a succession of crops without their becoming affected with disease. Leaf Stripe has been seen on several farms on the river, and in one case a bad infestation of this disease and Mosaic were seen on a field adjacent to one 16-acre block of B. 208. The chance of a good crop from this field is small indeed.

Mosaic is present in B. 208 on several farms along both sides of the river, and one field was 100 per cent. infected. There was a 40 per cent. strike, and only four sticks on a 4-acre block were found to be sound. The rest was stunted and the cane not worth harvesting. If farmers could see this field, it would be a warning to them against B. 208.

Top Rot occurs in Badila which had been under the floods at the beginning of the year and which followed the long dry spell. The disease is worst in the hollows where the waters lingered, and the occurrence fits in with the theory that it shows up in cane in which the growing point is tender after a long check.

Sclerotial disease is also present in B. 208, H.Q. 426, and Badila often in the same fields as the Top Rot, but can be distinguished by the fact that in this trouble the leaf sheaths are scarlet and tightly bound, the top being spindly and finally choking, giving an appearance very similar to Top Rot. It is caused by a fungus in the leaves and leaf sheaths. The leaves themselves show a pinkish tinge running about 3 in. up from the sheath, while Top Rot is distinguished in the corresponding stages by blood-red streaks in the leaves and of considerable length.

The farmers of this area are warned against the practice of getting plants from the Ingham line, owing to the risk of bringing Gumming disease from there, for it is not yet prevalent at Giru. This is important, and the idea of getting varieties from trucks in the mill yard should also be abandoned for this reason.

Grubs are doing considerable damage on a few farms on the Houghton, and an occurrence of wireworm has been reported to me.



The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has made available the following report of Mr. R. W. Mungomery, the Southern Assistant Entomologist, from 14th July to 15th August.

### BUNDABERG.

Insect ravages in the Bundaberg district have been comparatively small during the past few months, so that no artificial control measures have had to be resorted to. This freedom from pests at the present time is probably due to two causes—(1) Hibernation, and (2) the relative scarcity of the major cane pests in the Bundaberg district.

Hibernation is the term applied to the dormant condition of certain insects or animals during the cold weather, and this overwintering may take place in either the egg, larval, pupal, or imaginal stages, according to the insect under consideration. Some insects hibernate on account of the scarcity of their particular food plant, but on the whole, those cane insects which do hibernate, do so as a protection against the extreme cold, and not through any scarcity of their food. A well-known example is the case of *L. frenchi*, whose grubs hibernate in the second stage at a depth of about a foot or more in the soil. At the end of this quiescent period they moult and change into the third stage, resuming their destructive activities in the months of September and October. Farmers frequently plant their cane in August, thinking that by the apparent absence of grubs they have none to worry them, and it comes as a surprise to them to see their young cane yellowing in the summer months, and to find that grubs really are present, in which case the true cause is explained by the above facts.

Although we have in Bundaberg most of the serious cane pests which give trouble in the neighbouring cane-producing districts, yet it has frequently been a subject of comment that this place at present enjoys comparative freedom from these pests. This is no doubt due in a large measure to the scattered nature of the district, farms being in most cases situated close to large stretches of scrub and forest, which provide shelter and nesting grounds for insectivorous birds. Chief amongst these are the ibis, crow, pee-wit, magpie, butcher bird, and the sea-gull, the latter being confined mainly to the coastal section, and they are all useful in destroying soil-frequenting insects, which are the chief source of annoyance to the cane farmer.

### Pests Checked—The Farmer's Feathered Friends.

Through the activities of birds and parasites chiefly, and in a lesser degree due to outbreaks of fungus and bacterial diseases, pests have not been able to increase in sufficient numbers to regain the ascendancy and to occasion serious, or in certain cases, even noticeable losses. In expressing this the writer has in mind the cane grub *Pseudholophylla furfuracea* Burm. In past years this grub was reported to have caused considerable damage in parts of the Woongarra district, but unfortunately it now remains in minor importance. Contrast this with the position of the same grub in the Isis district, and it will be seen that a totally different state of affairs prevails there, where it is a serious limiting factor in cane production on many farms. The Isis district is much more hilly than the Woongarra, but otherwise conditions seem to be identical, such as the same red volcanic soils, and the bird and insect fauna would also appear to be similar. The question then arises why should the Woongarra district enjoy apparent immunity from *furfuracea* grubs whilst the Isis district is in parts heavily infested; and this becomes one of the problems that the entomological worker is called on to elucidate. It is not a straight-forward matter which can be answered at once, but it will probably involve years of work in studying the economic conditions governing the increase of our effective parasites. All this and probably more must be attempted before any definite and clear solution can be given which will satisfactorily explain the state of affairs existing at the present. Then only may we be in a position to recommend some measures that would preclude the necessity for fumigation, which involves a considerable outlay of money in providing injectors, fumigants, and labour.

### Pests and Their Natural Enemies—Need for Discrimination.

Going back to our comparison between conditions in the Isis and Woongarra districts, we find that in the former payment is made for the collection of grubs, and for this purpose children or boys are employed to follow behind the ploughs, collecting them as they are exposed by each furrow. This practice evidently is not considered necessary on the Woongarra farms, and the benefit, if any, should be with the Isis farmers, but this certainly does not appear the case; therefore weak points in the system must be looked for and rectified. Doubtless there are several



other contributory causes, but the following appears to be very evident, and to be a factor of great importance in this connection—namely, that little discrimination is made between parasites, predators, and the actual grubs themselves. All go into the collecting tin, to be paid for at so much per pint or quart, and as they all help to fill up the tin, beneficial insects as well as harmful ones are destroyed in this way. This has a reflex action in that these insects would in the ordinary course of events attain the adult stage and their progeny attack more grubs in the field, and so establish a natural biological control. By destroying them the activities of each species are curtailed. Digger wasp (Scoliid), Robber fly (Asilid), Carab, and predaceous Elaterid larvæ all come under the category of useful insects and should be protected.

### Useful Insects—Need for Recognition.

When the writer inspected the Isis cane fields for the first time he was impressed by the scarcity of parasites, &c., and in a report to the Director stated, “Too much cannot be expected from natural parasites. . . . These are remarkably few in numerical strength at present.” At that time the position, as far as parasitic aid was concerned, seemed rather forlorn, but he pointed out to many of the farmers several of the useful insects, which they had previously regarded as pests. These some of the farmers have guarded very religiously, and there is a noticeable increase on many of their holdings. It was particularly encouraging to notice one field which last year carried a heavy infestation of grubs was this season very free from grubs, and Asilid larvæ, or “concertina” grubs as one farmer aptly designated them, were present in hundreds. Of course to arrive at hasty conclusions does not provide a very sound basis on which to work, but knowing the voracious habits of these long white maggots it is only reasonable to assume that they in no small measure accounted for several of the cane grubs, and helped to clean up the field.

This is only one case cited out of several, and the presence of numbers of predaceous wireworms in the Bundaberg cane lands, with their freedom from grubs, would help to establish their claim as valuable friends of the farmer.

This advice then, is given with the intention of impressing on farmers, who in their turn should instruct boys collecting grubs, the necessity for recognising their insect friends, and allowing them to remain undisturbed in the soil. Honorary receivers, by refusing to accept quantities of grubs in which were mixed beneficial insects, could do much in tightening up the apparent looseness that now exists as far as friendly insects are concerned, and it behoves everybody to co-operate in every possible way to bring about a more effective natural control.

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## FIELD REPORTS.

*The Southern Field Assistant, Mr. J. C. Murray, reports (25th July, 1927):—*

### Bucca.

It is some years since the tonnage per acre equalled the present one. This is due to several important factors—namely, good rains early in the year, fertilizing, improved cultivation, and draining. Growers deserve their measure of success, for they are certainly a progressive group. There is still a fair amount of draining required in this area, as well as other districts, so that the following remarks on this phase of farm engineering may be of use.

*The Objects of Draining.*—The principal objects of draining are: To carry off stagnant water, to prevent the rise of springs, to allow the escape of excessive falls of rain, to render the land sufficiently dry for cultivation, and, at the same time, regulate the supply of moisture to the growing plants.

Thorough drainage not only lets surplus water out of the soil, it also greatly mitigates the effect of dry weather; when land is soaked with rain and dried by evaporation the soil becomes extremely hard.

*Digging the Ditch.*—The digging should commence at the lower end and proceed uphill, so that the land to be dug will be dry or practically so. It is important that the bottom of the drains should be properly graduated. A simple method of testing the fall is to pour water into the drain and note any interruptions in the flow. When the drains are deep and the sides likely to fall in the earth should be taken out of the whole length of the drain within a foot or two of the intended depth, and then the bottom spit can be taken out and the laying of the pipes and the bottoming all completed in one day.

*Size of Drain Pipes.*—As regards the size of drain pipes it is important that the capacity should be in proportion to the amount of water they have to carry



away. When drains are long, pipes of different diameter should be used, the largest size being at the point of discharge. As proof of this it can be pointed out that if a drain is 500 yards long, and the distance between drains 8 yards, the pipe at the mouth must be able to discharge all the water drained from the 4,000 square yards of land, while at the middle of the drain the pipe will only have to take the water from 2,000 yards. The following conditions influence the size of drains:—

Length of drain; depth of drain; velocity of fall; distance between drains; nature of soil (porosity, &c.); daily rainfall; spring water; and evaporation and vegetable requirements.

*Laying the Pipes.*—The laying of pipes, if not done by the farmer himself, should be entrusted to a careful workman paid on day wages, as more attention is paid to the performance of the task than if done by piecework.

The pipe layer must be careful to see that the bottoms of the drains are of stipulated depth, and properly graduated before he lays a single pipe, and when finally placing the pipes should pack in with "blinding" before the drain is hurriedly filled in. The pipes should be laid as close and tight as possible, and the clay carefully packed around them to keep fine particles of earth from washing in. There is no danger that the water will not find its way in. A plan should be kept of the system.

The subject of drainage, a very large one, will not be further touched upon in this report, but for further information growers are recommended to communicate with the Director of the Bureau. Drainage is so important to the sugar grower that, where necessary, it should not be neglected.

In the Bucca district, growers are obtaining good results from complete manures containing a predominance of potash. It is recommended that experiments be tried on lines laid down in last month's report.

Varieties doing well are M. 1900 Seedling, Q. 813, H.Q. 285, and D. 1135.

#### **Goodwood.**

This red volcanic soil area is yielding a good crop this season. Varieties making good growth are E.K. 1, E.K. 28, H.Q. 285, M. 1900 Seedling, D. 1135, and Uba. Growers are recommended to practise lengthy, systematic fallows of the land, as this is the best method of combating root rot disease, which is prevalent in this area.

#### **Gin Gin.**

It is said that fortune favours the brave, and it must be said that the growers in this area, having shown great courage and resource in meeting their difficulties, have been rewarded with an excellent crop. The variety probably looking the best is the M. 1900 Seedling. H.Q. 285 is showing good results; also D. 1135 and Q. 813. There is a certain amount of Mosaic to be combated, but this only presents a real problem on the Burnett River. It will mean disaster to the growers in this latter locality if they neglect to be careful in plant selection, but with reasonable care in this respect the disease is readily enough controlled.

Growers are advised to plant buffer strips of the immune variety Uba round their headlands, and if they cannot mill this cane it always makes excellent forage. The reason for making this suggestion is that the other canes would not be so closely in contact with disease-carrying grasses.

#### **Maroondan.**

The cane in this district looks well also. This black soil is very productive, provided it gets fair rains, and these, fortunately, have fallen this year. Provided no late frosts occur, the growers are assured of good crops. Cane varieties doing well are H.Q. 285, Q. 813, and M. 1900 Seedling. Disease does not present a problem here, but, nevertheless, the growers are reminded that, in common with other areas, the principal cane maladies are present, furnishing evidence for incessant care in plant selection.

#### **Bingera.**

Cane varieties doing well here are N.G. 16, Q. 813, Q. 855, Q. 812 A, Black Innis, and H.Q. 285. The first named is giving excellent results as a standover, particularly that which has been fertilized with molasses. There is no doubt that this product greatly improves the texture of some soils, as marked results from its use have been obtained in Queensland. Q. 812 A is an excellent cane, very like Q. 813, excepting that it is a slightly heavier stooler, with a greener foliage and leaf sheath. It is a

cane worth carefully watching.



*The Southern Field Assistant, Mr. J. C. Murray, reports (17-8-27):—*

During the period 14th July to 13th August work was carried out in the Childers, Maryborough, and Pinalba districts. In addition to the usual duties of the Field Officer, work in relation to Fiji disease under the Diseases in Plants Acts was performed. Growers are requested to co-operate with the Bureau staff in eradicating this insidious cane malady, and not compel drastic action by disregarding the instructions given in relation to control.

One very important matter that farmers must carry out is the eradication and destruction of diseased stools as soon as they are found, unless, for the purpose of demonstration and experiment, the pathological staff have given instructions otherwise.

### THE ISIS.

At Childers work was proceeding smoothly, although intermittent showers were causing slight checks in cutting.

#### Varieties.

The principal canes growing are M. 1900 Seedling, D. 1135, N.G. 16, M. 55, Black Innis, and H.Q. 285. Of the newer varieties H. 109 is the best. Badila is also grown, but not extensively.

As there is an inclination on the part of some growers to make their staple varieties M. 1900 and Badila, a discussion as to the merits and demerits of these canes would not be amiss.

N.G. 15 (Badila) has been tried many times in Southern Queensland and on the whole has been found unsuccessful; being a slow grower, it has not proved satisfactory in some instances, though in other cases it has done well. It has been found susceptible to Fiji disease and gum.

Badila, however, is a very fine cane, yielding a big crop in the average growing period, with a high percentage of c.c.s.

M. 1900 Seedling is a cane that, under favourable conditions, will produce a good annual crop of high sugar content. As it is a late-maturing cane, it is absolutely essential to grow a quantity of some early-maturing variety to commence cutting upon. M. 1900 Seedling is a variety susceptible to Root Rot disease, Mosaic disease, Fiji, and Gumming disease.

#### Clean Fields—Farmers Commended.

There are several matters upon which the Isis growers can be congratulated, and one particularly, and that is the clean state of the farms. This is due to plenty of surface cultivation. Weeds are a curse. They injure the plant and reduce the yield in many ways. They crowd and shade the young canes, keeping away the sunshine and making them spindly. They steal food from the plants, disputing with the young crop Nature's storehouse of soil food. Weeds rob the crop of water as well as of food. They use as much—sometimes more—in proportion to their size as cultivated plants. It is in this way they inflict the greatest damage on crops.

Cultivation is the great weed-killing factor—at all events for crops that permit of interspace working, like cane. It is, however, important to know at what stage of a weed's growth it is easiest killed. The vulnerable stages of weed growth are just at sprouting and flowering time. Pasture weeds (perennial) are best killed when in flower, but the sprouting stage is the best time to tackle weeds on cultivated land. Weeds are mostly in the top inch of soil, and very little disturbing will expose the sprouting seeds and young weeds to the hot sun, when they will die. A good farmer hates weeds, but weeds, like the poor, are always with us, and we are liable to grow indifferent to both.

### PIALBA.

A short time was spent in this district. Pinalba is one of the healthiest cane districts in Queensland. Farmers should not, however, relax on this account, but be active with regard to plant selection and knowledge of disease, until they are 100 per cent. efficient in this respect.

Cane varieties observed making good growth are Q. 813, H.Q. 285, H. 109, H. 227, H.Q. 77, Black Innis, D. 1135, and Malagache.

Q. 813 is actually the best of these. H.Q. 77 is a cane the writer would advise the farmers to try more than they are doing. It is a heavy cane of good sugar content, though not a heavy stooler.



**MARYBOROUGH.**

Good crops are being cut here, although at present, in one or two varieties, particularly D. 1135, density is not high. However, taking everything into consideration, the sugar industry is gradually getting on a better footing, especially with the advent of motor lorries for haulage. The farming standard is improving, and better varieties are being grown. Farmers are recommended to plant H.Q. 285 and Q. 813 as much as possible.

There is no need to enlarge on what will happen to the crops if Fiji disease is ignored. The growers know the position, or if any are in doubt, let them visit an infected farm and note the injury.

Farmers are advised to study the art of farm road-making, as good farm roads minimise expense of transport, increase farm efficiency generally, and enhance the value of the property.

*The Central Field Officer, Mr. E. H. Osborn, reports for July, 1927:—*

**AYR (KALAMIA AND PIONEER).**

This area was inspected about the middle of July and looked remarkably well with beautifully green grass everywhere, creeks running and lagoons and waterholes carrying a splendid supply of water.

This is certainly out of the common for such a time of the year, and very old growers say that they cannot remember such ideal conditions for very many years.

Up to date the splendid total of 43.21 in. of rain has fallen—i.e., January, 16.04; February, 14.30; March, 3.45; April, 0.10; May, nil; June, 5.19; July, 4.13; total, 43.21 in., which is just about the average yearly rainfall for the Burdekin for a number of years.

It is to be hoped that this is only the first of many such seasons that will enable the Burdekin to again grow the phenomenal crops that were once so characteristic of the district.

As regards the present season's crops, they are certainly very good and show improvement since my visit here some three months ago, but one would have expected to see the cane more forward under such ideal conditions. It was pointed out, however, in my April report, that the very heavy falls in the early part of the year culminating in floods came along at a time when the cane was making splendid growth and then ceased abruptly, being followed by two practically dry months, resulting in large areas of the ground becoming absolutely caked, thus giving a decided check to the growing crops. Luckily, however, the good rains of June and July came along, saving fresh pumping operations and giving the crops a fresh lease of life.

As regards the young plant cane, in most places there has been a very good strike, the exception seemingly being in the lower lying portions (of which Kalamia has probably a larger percentage than Pioneer), more especially those that were in an extra good state of tilth.

For instance, one very thorough Jarvisfield grower gave his ground two ploughings before the very heavy rain, and as soon as possible after the downpour ploughed in a very heavy crop of grass, followed up by another two ploughings before planting. Good plants were used, but the strike was a very poor one, large quantities of "misses" having to go in.

In an adjoining block, which was only worked after the rain and which was in a poor state of cultivation, he, however, obtained an excellent strike. It seems as if heavy rain on extra well-worked soil is calculated to cause the soil to set too much. Present prospects for next year, however, indicate such a large crop that the local mills will be taxed to their utmost to handle same.

When the district was visited both mills were in full operation and doing very satisfactory work, delayed only by wet weather on a couple of occasions. Considering the rain that had fallen the density figures were exceedingly good, B. 208, H.Q. 426, and N.G. 15 being the best. E.K. 28 was also giving good returns, considering that it does its best in September and October generally; Q. 813 was also giving good returns, one sample going 16.2 being noted, whilst 99 tons of it gave an average of 15 c.c.s., with the period of supply ranging from 4th to 23rd July.

**Varieties.**

N.G. 15 (Badila), H.Q. 426 (Clark's Seedling), B. 208, M. 1900, E.K. 28, Q. 813, N.G. 25 (Goru), Hybrid No. 1, and Q. 903 are amongst the canes grown in the area, and each yield good returns upon suitable soils.



Badila, upon suitable soil, is one of the very best, but unfortunately in this area suffers from Top Rot in several places, otherwise it is an ideal cane, being easily the best variety to stand over.

Clark's Seedling is also a wonderfully sweet cane, very suitable for early cutting, but on many farms carries an undue proportion of dead stalks, apparently suffering from a species of Wilt or Rot.

B. 208 is a wonderfully sweet cane, too, but unfortunately is too liable to Leaf Stripe; in fact, there is so much of the disease in this variety that there is a probability of its going out of cultivation.

E.K. 28 has been planted out very extensively this year, and there is also a large acreage of it to be crushed this season. Some really splendid crops of it were noticed, and the density returns of same will be very interesting.

Q. 813 is a cane that is well worth growers' attention for poor to medium ground, for it is a splendid striker, quick grower, and hangs on to its density on suitable land practically all the season. It is also about the most free from disease of any cane. Its faults are that it is a shallow rooter, and in light sandy or grubby areas will fall down very easily.

M. 1900, for late cutting, is also a good cane.

### Green Manuring.

Examples of typical Burdekin soils indicate very clearly that the above is to be highly recommended. Corn, on account of its relation to Mosaic, should not be grown anywhere near the cane paddock, therefore cowpea should be used. As mentioned in an earlier report, the Kalamia mill management have had very good results from same.

Liming, except in the very heavy, stiff soils, does not seem necessary. A top dressing of sulphate of ammonia or nitrate of soda upon ratoons in a year like the present will, however, be found to be very payable.

### Diseases.

Leaf Stripe, Top Rot, and a little Mosaic are the chief diseases in this area. As for the first it is chiefly confined to B. 208, and shows up far more in the ratoons than in the plant cane. This year's crop contains a fair proportion of the above cane, and in most farms where the cane is growing, from a few to a large number of diseased stools can be seen. Control measures are digging out and burning affected stools, ploughing out and planting with a resistant variety, otherwise B. 208, as a cane variety, is liable to go out. Some years ago a large quantity of this variety was grown upon the Herbert River, but Leaf Stripe and Mosaic became so bad that it finally went out of cultivation.

Top Rot is mainly confined to Badila, although a certain proportion was noticed in B. 208 and M. 1900 in the early part of the season.

Mosaic in Clark's Seedling was noted at Airedale and Jarvisfield. In every case the disease was pointed out to the farmers, and they promised to eradicate the stools.

Red Rot in Clark's Seedling was also seen upon a Macdesme farm.

Grubs and White Ants seem to be the chief cane pests upon the Ayr side of the river, but luckily are confined to isolated areas.

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*The Northern Field Assistant, Mr. A. P. Gibson, reports for the month of July.*

### CAIRNS.

During July not much rain fell; the weather was warm at the beginning but decidedly cold at the end of the month.

The total rainfall for the year up to the end of July was 83.03 in.

The crop had improved little in growth since my last inspection—generally, it was very backward, rather low shaped, and below early estimates. Climatic conditions largely influence the production of cane and its sugar content. The crop's backward nature may be attributed to the February disaster, which occasioned severe damage to the root and top system. Grubs in no small degree had seriously retarded the growth in many canefields. It is earnestly hoped that the plant cane will weigh better than the ratoon so far harvested.



**Varieties.**

The principal variety grown at Freshwater is N.G. 15 (Badila); much of this kind was seriously damaged by water, the non-functioning of the top causing heavy stem shooting. Hambledon, Waree, and Sawmill Pocket grow principally D. 1135, H.Q. 426, N.G. 15 (Badila), 7 R. 428 (Pompey), and a very little H.Q. 458; this variety permits heavy weed growth, and is not desired because of the harbourage offered to pests and fungi, and to the spreading of weeds.

**Harvesting and Grinding.**

The weather has been ideal for this work. The covered areas are being bared with amazing speed due to crop lightness. The quality of the cane at the beginning was lower than usual. A common complaint is light cane trucks. The company make allowances for damaged flood cane, but will not tolerate trashy cane; that containing over much leaf is promptly returned to the harvesters for cleaning. Patches of cane were accidentally fired by passing locomotives. At the present moment it is thought the early crop estimate will not be reached.

**Cultivation.**

This part of the business is worthy of more consideration. Some fields have been ratooned when they should have been ploughed out. Ratooning should be performed as soon after trash burning as practicable; if delayed, serious consequences may follow. Harvested fields are sometimes cross-harrowed by discs prior to ratooning; this is to be highly recommended, especially in poorly harvested fields. Tractors big and small are going their hardest, and are indispensable in our days for the general advancement of all classes of field work. Recently harvested fields are being prepared for immediate planting. This is the time when surface soil tilling of interspaces is of much value; it controls weeds, conserves moisture, promotes growth, and in every way benefits the present and subsequent crops. Neglected headlands are a danger to clean fields. Home-made weeders were doing good work. It should be understood that as much as possible of the plant foods of a crop raised in a field should be returned to it, if not the soil from whence it was taken is so much the poorer.

**Planting.**

Planting is in progress. Some fields have been well tilled, others have not. The thorough preparation of the soil, coupled with judicious plant selection, has a powerful influence on subsequent crops; the intelligent farmer understands the great value of such a wise procedure. Edmonton forest land is costing some £40 per acre to clear and plant. Old orchards at Freshwater are gradually being cleaned up and planted to cane. Too much soil over plants is a common error; following lighter implements have the great tendency of adding still more covering.

**Manure.**

The soil must be moist enough to admit of manure being readily dissolved and conveyed to the roots. Different fertilizers at different rates are being added to the plant and ratoons. Offal from nearby slaughter-houses is being spread over some of the poorer fields. Molasses should be a good soil improver. An adjacent Hambledon mill red soil farm had received some 25 tons filter press cake per acre and much mill refuse water. Over 40 tons of N.G. 15 per acre was being harvested. The foliage coloration was fine.

**Pests.**

Grubs and Big Moth Borer are killing more shoots than usual. Midrib Borer frequently occasions dead stripes in leaves. Army Worms, Leaf Hoppers, and Linear Bugs plentifully found.

**Diseases.**

To prevent the ever spreading of these we must endeavour to eradicate the source of infection. If our farmers would co-operate more the annual losses would be lessened. The good achieved by some is being undone by others. Leaf Scald very prevalent in Badila in parts. Leaf Stripe was also seen on three farms at Sawmill Pocket. It is gratifying to note the energy displayed by the farmers that have this. The varieties affected are Pompey and D. 1135. Top Rot less severe now. Spindle Top and much leaf rust noted.

**MULGRAVE.**

Harvesting and grinding is proceeding smoothly. The big factory continues to do splendid work, and it has made satisfactory progress with its new crop. To the present moment little time had been lost. Some 30,000 tons has been milled. The



mill average sugar content is now over 13.5 per cent. and steadily rising. More double-tiered cane than usual is coming forward for treatment. Some short, heavily soiled, poor-looking cane is being harvested on the severely inundated river flats. The under stem shoots on the fallen canes had perished; the upper ones had grown vigorously and are now showing some foot of cane; these shoots are existing on the stems and are considerably reducing its sugar content.

Weevil and the big Moth Borers were very active in such places. The crop appearance had improved much during the last nine weeks. Wintry conditions should have a beneficial effect so far as its quality is concerned. Brown patches among the green indicated the grubby spots. The early crop forecast of about 160,000 tons still is unchanged.

Gumming disease still at Aloomba. The writer had little difficulty in finding this. Gum oozed freely from the cut cane ends of the variety H.109 growing adjacent to the southern banks of the Mulgrave River on two farms. Mosaic disease was abundantly noted in the same variety.

### Filter Press Cane.

The value of this was clearly indicated on a Highleigh farm. About a chain of poor soil extending right along a big block had received a good dressing; the cane had not arrowed and was outstanding in colour and growth.

A good preparatory tractor-drawn implement (Australian made) was seen at work on a Highleigh farm (known as "The One Way Disc"). It contains eight discs, and when operating divide finely the old stubble and just goes deep enough to plough same out. The resulting work is improved by passing a disc harrow over it.

### LITTLE MULGRAVE.

The picturesque fertile Upper Little Mulgrave River Valley has produced another good crop in spite of the severe flooding in parts. The coloration of the cane was especially green where it had been submerged, thus proving the immense value of water-borne soil transported at time of flooding. Leaf Scald and Brown Rot noted. Stools having the latter complaint simply die right out, and the ground end of stems, if opened, will be found to be of a brown pithy mass. The writer thinks it is a fungus passed over from wood to cane; so far as is known, found only in new scrub lands. Floods do good as well as harm. Last year the crop here was greatly damaged by rats. So far little injury has been occasioned by them; it would therefore appear that the flood had swept the pest away. Last year this area yielded some 15,000 tons; 1927 it is forecasted to produce about 13,000 tons.

### BABINDA.

Rainfall to 23rd July over 5 in.; for year to same date, 139 in. A sunny patch followed the long dreary wet; this was generally welcomed. Overmuch rain at the beginning was prejudicial to the harvesting. The factory is now grinding continuously and well. The ever-rising mill average c.e.s. has reached 13.5 per cent. Forty thousand tons of cane had passed between the rollers, and another 150,000 remained to be milled. Approximately 11 per cent. of the total cane harvested is being burnt by permission prior to harvesting.

### The Crop.

The crop is again satisfactory. Shabby patches were noted among the good. The cane possessed a healthy colour, but did not appear to be making its usual headway; the shortened period of cultivation obviously had an ill effect on its season growth. Grubs ravage decidedly less this year. The fields are cutting out quite up to early expectations. Lighter cane trucks may be attributed to crooked nature of cane rather than light cane.

It is customary to burn all trash as soon after harvesting as possible. Prevailing wet conditions have been responsible for most unsatisfactory burns. This rubbish is a breeding ground for some of our dreaded pests and hinders the necessary inter-space cultivation, therefore it is highly recommended, where possible, to horse-rake this into lines and burn when favourable. The rotary cultivator is popular and doing good work, but is considered costly.

Early plant cane had germinated favourably and is making good growth, but the ground surface appeared hard in places. Farmers are preparing more land for planting; others are planting. It is not advisable to plant the following:—

- (1) Severe grub-eaten cane; this is lacking in vitality.
- (2) Borer-tunnelled or badly rat-eaten cane. The former may spread the pest to clean fields; the injury caused by the latter serves as an easy inlet for either pests or fungi and frequently is responsible for unsightly misses.



Old stumpy land is being cleared with the help of explosives, costing all the way from £7 to £15 per acre.

### Birds.

Encourage bird life at all times on the farm; they are of untold value in keeping down pests. The good old Ibis, especially the black variety, is abundantly seen at present on the farms; the white kind is more shy and prefers sporting round the swamps.

### Pests and Diseases.

Grubs and Weevil Borer are damaging cane severely in parts. Cocoons of the tachinid fly, its valued parasite, and the fly itself were found at Bucklands and nearby Babinda farms. The recommendation to leave small patches of cane to standover was urged.

Leaf Scald severe in the Goru family of cane, H.Q. 426, and to a lesser extent in Badila. Spindle Top responsible for great all-round losses in Badila No. 1 Division.

### Wireless Plants.

Since the recent blow many wireless plants have been installed in the various sugar areas.

## THE COTTON INDUSTRY—TAKING STOCK.

In view of the approach of the coming cotton planting season the Acting Premier and Minister for Agriculture and Stock, Mr. Forgan Smith, informed the Press recently that it was desirable to take stock of the present situation in the light of last year's experience. The prospects ahead of the cotton industry were at the present time bright, and such as to afford encouragement to cotton growers to increase their area. In 1926, during the planting season, there was a slump in the world values of cotton, the price of American middling on the Liverpool market dropping from 10d. to 6½d. per lb. Further, at that time the question of a bounty on cotton was uncertain, and no definite understanding had been arrived at with regard to the ginning of cotton and the sale of seed. As a result uncertainty existed among all interested in the industry, and the consequence was a small planting. Some growers went in for dairying and others planted broom millet.

Since then the whole situation has changed for the better. The Queensland Cotton Board, operating under marketing organisation legislation initiated by the Government, has been successful in improving marketing conditions generally. Acting on behalf of growers satisfactory arrangements have been made for the ginning of cotton and for the sale of seed, and these have resulted in many economies. Owing to the establishment of cotton manufacturing industries in Australia the whole of the 1927 cotton crop has been marketed within the Commonwealth at prices based on import parity; this means a substantial improvement in the price which is being realised by growers on what they would have received if it had been necessary to export the cotton and accept world parity. The Commonwealth bounty of 1½d. per lb. of seed cotton has been definitely fixed for a term of years ahead.

The 1927 cotton crop has, generally speaking, been of high quality, the bulk of it having been classified in the long staple grades for which there is the best demand at the most favourable prices. If this quality is maintained there is every prospect of marketing in Australia in 1928 at an Australian price a crop of double the quantity produced in 1927. The world price of cotton has made a recovery and now stands at a higher level than was in prospect during the last planting season.

Advice has been received from the Cotton Board that the demand for seed for the coming planting is very satisfactory. Large areas of land throughout Queensland are favourable for the production of cotton, and those with the knowledge of the industry considered that the time is now opportune for growers located in areas suitable to the production of the crop to immediately and seriously consider the question of taking up such production. It is desirable to emphasise, however, that for the successful production of cotton, the land should be thoroughly prepared and well looked after during growing operations. Haphazard and inefficient methods of cultivation are bound to bring about disappointing results. The Department's officers are available at all times to advise intending growers, and in the meantime it is hoped that every opportunity will be taken by farmers to avail themselves of the favourable prospects at present existing in this promising industry.

## SOME NOTES ON CUTWORMS IN COTTON.

By E. BALLARD, B.A., F.E.S. (late Commonwealth Cotton Entomologist).

The opening of the cotton season 1926-27 was marked by widespread attacks of cutworms, *Euxoa radians* Guer., which damaged not only cotton but other crops as well, and considerable loss was occasioned. Many cotton farmers lost their entire planting, and this loss was aggravated by the fact that no further planting rain fell until the middle of December, a date which, over most of the cotton-growing areas, is too late for bringing a full crop to maturity.

So far as the limited staff allowed, demonstrations were given to farmers in the various cotton districts of the use of the Paris green and bran baits for poisoning the cutworms, and before the attack developed notices appeared in the Press warning cotton-growers of the possibility of cutworms appearing.

A very severe infestation took place at the Cotton Research Station at Biloela, in the Callide Valley, and in consequence it was possible to make some observations on the nature of the attack which seemed of sufficient general interest to farmers to warrant their publication as, so far as the writer has been able to discover, they have not before appeared in print.

Observations of cutworm infestation have not been carried on for sufficiently long a time for one to be able to say whether these pests are to be expected every spring, as is the case with the corn earworm, or whether they will only occur in certain years. For the present it would be safer for all cotton farmers to regard cutworms as annually occurring enemies and to take the necessary precautions to render their assaults harmless.

The history of the cutworm invasion at the Cotton Research Station is as follows:—

Cotton was sown in the last week of September and the first week of October and damage to the cotyledons or first leaves was first noticed on 13th October. This damage was in some places very severe, the leaves being entirely devoured. Five acres of cotton was entirely destroyed or so badly damaged that the surviving plants were ploughed out.

Baiting was resorted to, and dusting with calcium arsenate, and by 21st October the attack had died down and was over by 25th October. There was a reerudescence in November which was immediately checked by means of the Paris green bait, and since then there has been no further trouble.

The peculiar feature of this outbreak and where it differed from others which have been investigated was that the worst damage was done by very young cutworms, for which the bait appeared to be too tough. These young caterpillars, instead of being one or two to a plant as is usual with the older ones, fed in masses and in a single night played great havoc, some feeding on the cotyledons almost as soon as they unfolded above ground.

Generally the most destruction is done by cutworms which are half grown and it appears to be rare for smaller ones to be found feeding on the cotton seedlings.

So long as cutworms were available in sufficient quantities, constant observations were carried on both in the field and in the laboratory, and



as a result of these certain conclusions were arrived at which are as follows:—

Moths first emerge during September and before eggs are laid certain conditions have to be fulfilled. These appear to be the presence of cover such as that provided by low spreading plants like bull head (*Tribulis terrestris*) or pigweed (*Portulacca*).

The soil in which eggs are to be laid must be moist but not wet, and the bull head or pigweed must be in such a state of growth that it acts as a mulch, keeping the soil moist during the hatching period.

Egg laying invariably took place after one of the light showers experienced in November, and always and only in places where the conditions of moisture obtained which have been outlined above. Bull head which has become straggly and ceased to provide shelter was never chosen, while thick matted bull head nearly always yielded a find of eggs or young caterpillars.

So long as there is a plentiful supply of bull head the younger stages of the cutworm do not scatter but remain feeding on the leaves of the bull head. It appears to be only the half-grown caterpillars which wander from the place where they hatched in ever-widening circles.

At Biloela when the cutworms first appeared there was very little bull head or pigweed growing owing to the prolonged dry weather, and this probably accounts for the fact that the young cutworms attacked the cotton in the way they did.

Another very important conclusion which the evidence seemed to warrant was that eggs are never laid on or under the cotton plant, and that in a clean field all damage done by cutworms would be from invasions from headlands or from neighbouring unweeded paddocks.

If forced to do so by special and peculiar circumstances, a moth will lay in situations other than those described, but this is rare and normally eggs are laid in moist soil and under cover.

An interesting example of a forced laying was found where a moth had laid her eggs in the web of a Red-back spider (*Latrodectus hasseltii* Thor.).

Cutworm eggs will not survive the action of direct sunlight and layings made under bull head, when exposed to the sun, shrivelled up.

Bull head appears to be the favourite plant under which to lay, and the eggs are often lightly covered with soil and are sometimes difficult to find. Pigweed is also used but not so commonly as bull head.

Eggs have been found under *Euphorbia drummondi*, but the cutworms would not eat it.

The soil conditions under this plant were ideal from a cutworm's point of view, and this probably enticed the moth to lay there. It is very unusual to find dead moths lying under bull head amongst the eggs. Of the numerous plants examined only these had eggs laid under them.

Natural enemies of the cutworms soon get to work and a second serious attack after the first outburst seems rare, although caterpillars can be found on headlands and weedy paddocks through the summer.

For next season the proposal is to work along the following lines:—

- (1) Bearing in mind the marked preference shown for bull head and pigweed, to keep all fallows as clean as possible.
- (2) To plough a steep-sided furrow along headlands, to catch invading cutworms after the crop is planted.





CALLIDE COTTON RESEARCH STATION, BILOELA.



- (3) This furrow might be baited with Paris green and bran or pollard. (Half to full grown cutworms will readily eat bait which is quite dry and which has been lying in the field for some ten days.)
- (4) If an invasion does take place it will only be necessary to put bait in front of the advancing cutworms, and not to cover the whole field.

When baiting, little heaps should be put by the stem of each plant so that the cutworms must find them on their way to feed at night.

Dusting very young plants with calcium arsenate appears to be useless as their leaves will not hold the dust as they do when they are older.

The accompanying map shows the cultivation at Biloela and the cutworm invasions. This is very typical of other farms examined in the vicinity.

To recapitulate: Provided that the paddocks are clean cutworm attack will only come from weeds on the headlands, and the favourite food plants are bull head and pigweed. Attacks may generally be expected in October and perhaps early in November. One or two cases of cutworms damaging crops were reported in January.

After the first emergence of moths and the subsequent egg laying, the natural enemies of the cutworm get to work and soon make themselves felt. These enemies include so far as we have found this season:—

- (1) An egg parasite. This was abundant in December.
- (2) A small Braconid wasp which parasitized the half-grown caterpillars. This was rather rare in the Callide, but very common on cutworms collected at Gatton.
- (3) A Tachinid fly, also a parasite of the caterpillars but not very common.
- (4) A predatory wasp. This wasp was present at Biloela in very large numbers and collecting cutworms steadily during November, December, and January, although it was not so common during the latter month. None of these parasites has yet been identified.
- (5) The onset of rain and high atmospheric humidity in the middle of December made it very difficult to rear cutworms in the laboratory, whatever precautions were taken to keep them dry. It is possible that excessive moisture has the same adverse effect on them as it does on corn earworm, the symptoms shown by the dead caterpillars being very similar.

In the summer months the life of the cutworm occupies just about seven weeks from egg to moth, thirty days being passed as a caterpillar. The stages which do the most damage appear to be during the last fifteen days—i.e., from stage three onwards.

It is not yet known how long the hibernation period is nor when it begins, nor the temperatures which would induce it. It seems probable that, after a mild winter like 1926, cutworm attack could be expected earlier than after a severe winter when the soil was colder and would take longer to heat up to the temperature necessary to induce moths to emerge.

During the last cutworm outbreak, an interesting observation was made when it was found that a plot of ratoon cotton was attacked and very badly damaged before the cutworms moved on to the plant cotton.



This is worth recording as it has been stated that ratoon cotton is not attacked.

The younger that plants are when the cutworms begin to eat them, naturally the more serious is the result, but more advanced plants do not feel the loss of the leaf nearly so much.

At Biloela in November it was known that cutworms were present in one block as the predatory wasps were hunting there all day and in large numbers, but the damage was nowhere appreciable. Fortunately it is rare for *Euxoa radians* to girdle the young cotton plants, although it does sometimes happen. This habit is far more serious than that of eating the leaves, and is common with other species. The problem before the cotton farmer seems to be to keep his fallows clean and also the growing crop so that moths are not tempted into the fields to lay, and to protect the young plants from invasions from headlands or neighbouring paddocks.

So long as moths can be prevented from laying their eggs in the cotton fields when the expense of widespread baiting would be involved, it is a comparatively simple business to check an invasion from the headlands, as only a small part of the field would have to be baited. The two most dangerous weeds are bull head and pigweed.

The bait formula has often been given, but is repeated here:—Bran or pollard, 25 lb.; Paris green, 1 lb. Mix well together. Then add water sweetened with molasses so as to make a mash which will just crumble in the fingers. Put little heaps at the foot of each plant in the neighbourhood of the invasion and for a short distance ahead of it in the evening. Be prepared to repeat the application in a week's time. Do not wait for an attack before buying Paris green. Have it ready for instant use.

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### THE CUTWORM MENACE.

#### FARMERS PROTECT YOUR SEEDLING COTTON!

Every year some damage is done to cotton seedlings by cutworms. These cutworms are greyish-brown caterpillars about  $1\frac{1}{4}$  inches long when full grown, and represent one of the four stages in the life cycle of a moth.

The cutworm moths have been observed to lay their eggs under weeds on the headlands, &c.

On hatching from these eggs the young caterpillars move into the cotton fields and eat the leaves of the seedlings.

#### TO AVOID TROUBLE FROM CUTWORMS THE FOLLOWING MEASURES ARE RECOMMENDED.

Plough a deep furrow round the field immediately after planting; the steep side of the furrow next to the crop.

This may frequently effectively stop the advance of the caterpillars, but if necessary sprinkle poison baits along the bottom of the furrow when the attack is actually in progress.

Keep the fallow and newly-planted fields free from weeds or centres of attack may be found *inside* the crop.

If an attack inside a field is noticed, scatter poison baits over the whole affected area and a few yards beyond.

Don't wait till the damage is done before taking action. Be on the look out for an attack *from the moment the seedlings come through the ground* until they are 6 inches high.

Poison bait formula:—

Bran	..	..	..	..	..	25 lb.
Paris green	..	..	..	..	..	1 lb.
Molasses	..	..	..	..	..	1 quart

Mix bran and Paris green together dry, then add molasses and water till mixture is moist and crumbly but not wet.

Warning.—Paris green is very poisonous, and must be kept away from poultry and other live stock, as well as human beings. It will not harm the skin when handling.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JULY, 1927 AND 1926, FOR COMPARISON.

				AVERAGE RAINFALL.		TOTAL RAINFALL.						AVERAGE RAINFALL.		TOTAL RAINFALL.	
Divisions and Stations.								Divisions and Stations.							
				July.	No. of Years' Re- cords.	July. 1927.	July. 1926.					July.	No. of Years' Re- cords.	July. 1927.	July. 1926.
<i>North Coast.</i>				In.		In.	In.	<i>South Coast— continued:</i>				In.		In.	In.
Atherton ... ..		0·90	26	2·16	0			Nambour ... ..	2·92	31	0·30	1·34			
Cairns ... ..		1·57	45	2·02	0·27			Nanaïgo ... ..	1·74	45	0·55	1·02			
Cardwell ... ..		1·39	53	2·04	0·63			Rockhampton ...	1·46	40	2·27	0·26			
Cooktown ... ..		1·00	51	1·20	0·50			Woodford ... ..	2·48	40	0·49	0·13			
Herberton ... ..		0·72	40	1·85	0·26										
Ingham ... ..		1·52	35	3·10	0·67										
Innisfail ... ..		4·67	46	6·76	2·69										
Mossman ... ..		1·42	14	1·48	0·10										
Townsville ... ..		0·56	56	5·26	0·19			<i>Darling Downs.</i>							
								Dalby ... ..	1·77	57	0·41	0·64			
<i>Central Coast.</i>								Emu Vale .. ..	1·58	31	0·84	1·23			
Ayr ... ..	0·65	40	4·13	0				Jimbour ... ..	1·62	39	0·27	0·38			
Bowen ... ..	0·93	56	2·49	0				Miles ... ..	1·69	42	0·07	0·30			
Charters Towers ...	0·62	45	2·63	0·17				Stanthorpe ... ..	2·07	54	0·10	1·65			
Mackay ... ..	1·67	56	3·29	0·13				Toowoomba ... ..	2·08	55	0·52	0·89			
Proserpine ... ..	1·30	24	3·61	0·24				Warwick ... ..	1·84	62	0·46	0·92			
St. Lawrence ... ..	1·28	56	3·38	0·06				<i>Maranoa.</i>							
								Roma ... ..	1·49	53	0·16	0·18			
<i>South Coast.</i>															
Biggenden ... ..	1·42	28	0·70	0·55				<i>State Farms, &amp;c.</i>							
Bundaberg ... ..	1·89	44	1·06	0·18				Bungeworgorai ...	1·73	12	0·10	0·12			
Brisbane ... ..	2·28	76	0·52	0·85				Gatton College ...	1·45	27	0·14	0·36			
Caboolture ... ..	2·27	40	0·52	0·57				Gindie ... ..	1·04	27	0·11	0			
Childers ... ..	1·77	32	1·43	0·92				Hermitage ... ..	1·81	20	0·76	0·98			
Cromhurst ... ..	2·97	35	0·47	1·00				Kairi ... ..	1·25	12	1·54	0·36			
Esk ... ..	2·02	40	0·80	0·60				Sugar Experiment							
Gayndah ... ..	1·49	56	0·99	0·34				Station, Mackay	1·50	29	3·07	0·07			
Gympie ... ..	2·21	57	0·46	1·05				Warren ... ..	1·27	12	1·05	0·13			
Kilkivan ... ..	1·79	48	0·63	0·20											
Maryborough ... ..	1·94	55	0·81	0·99											





PLATE 60.—AT THE INAUGURAL CEREMONY.

The Show was opened officially by Lord Stonelaven, Governor-General of Australia, on 10th August

*From left to right:* —, Sir John Goodwin (Governor of Queensland), Hon. W. Forgan Smith (Acting Premier of Queensland), Mrs. W. Forgan Smith, Mrs. S. M. Bruce, the Right Hon. S. M. Bruce (Prime Minister of the Commonwealth), Lady Stonelaven, Lord Stonelaven, Lady Goodwin, Mr. Ernest Baynes (President of the Royal National Association).

# ROYAL NATIONAL EXHIBITION.

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QUEENSLAND'S GREAT ANNUAL AGRICULTURAL EVENT—THE FRUITS OF FARM AND FIELD, OF SOIL AND TOIL, GIVE EVIDENCE OF THE ATTAINMENT OF HIGH STANDARDS OF HUSBANDRY—THE ALLIANCE OF THE SCIENTIST AND THE FARMER—THE STATE'S GREAT ADVANCE IN RURAL AND COMPLEMENTARY URBAN INDUSTRY MADE MANIFEST—ANOTHER SUCCESS ADDED TO THE LONG RECORD OF THE ROYAL NATIONAL ASSOCIATION.

This year's Brisbane Show, held on 8th August and following days, was a revelation of the enormous natural wealth of Queensland and her extraordinary productive capacity, even in a year of unusual dryness.

The inter-dependence of rural and urban industry; the intricacies of commerce as applied to primary production; the principles and practice of modern farming; animal husbandry in all its branches; the mechanisation of agriculture; the extent of Queensland's rural wealth were all typified, represented, or demonstrated.

In huge daily crowds, prosperous-looking and orderly, were reflected the general happy social conditions ruling in the Queen State of the Commonwealth.

A week of brilliant weather completed the success of the Exhibition which, from every point of view, was equal to the high standards set by the National Association in previous years.

**B**RIGHT days and cloudless skies, with just that suggestion of wintry keenness that makes the mid-year months in Queensland so delightful, was Nature's generous contribution to the success of this year's Exhibition. The Show was opened officially by the Governor-General of Australia, Lord Stonehaven, on 10th August, in the presence of a large crowd, which included many notable visitors from the Southern States.

The Court of the Department of Agriculture and Stock; the pine forest in miniature of the State Forestry Service; the comprehensive district exhibits; the "one-man farm" exhibits, each in itself a microcosm of a country show; the competitive entries in the agricultural produce section; and the Rural Schools' display were the outstanding pavilion features. Out in the arena were paraded representatives of fashionable Herd-book families. Coming under the critical scrutiny of some of the best stock judges in Australia, they survived the test with honours. Some of the most successful breeders from other States who were present were not slow to express their satisfaction with the quality of Queensland purebred stock in every section. Blood and draught horses, worthy representatives of their respective breeds, won public as well as judges' commendation. A remarkably fine troop of police horses bred at the Government Remount Station, of the type that has won fame for the "waler" wherever horses are spoken of—the type that proved its mettle on the long desert marches in Sinai and Palestine at the time when the Australian Light Horse, with other units of British cavalry, made history as the greatest mounted field force the world has known—was immensely popular.

A group of Clydesdale sires which have been placed by the Queensland Government at the disposal of farmers for farm horse improvement commanded equal attention, and shared in the appreciation evoked by the police remounts.

This year the spacious John Reid Hall and its associated annexes were occupied by the Chamber of Manufactures with some impressive displays of secondary products made in Queensland.



Temperate and tropical fruits, in extraordinary variety and excellence of quality, also provided evidence of the wide range of climate and richness of soil which Queensland enjoys.

In the following pages many of the exhibits are reproduced pictorially. Our photographs are the work of Mr. H. W. Malcher, F.R.A.S., F.R.S., artist and photographer to the Department of Agriculture and Stock.

Included in the gathering at the opening ceremony, besides the Governor-General and Lady Stansfeld, were the Governor of Queensland, Sir John Hindle, and Lady Hindle; the Deputy Premier and Minister for Agriculture and Stock, Hon. W. Forgan Smith, and Mrs. Smith; the Prime Minister of the Commonwealth, the Right Hon. S. M. Bruce, and Mrs. Bruce; the President of the Royal National Association, Mr. Ernest Barnes, and Mrs. Barnes; the Under Secretary for Agriculture and Stock, Mr. E. Graham; the Assistant Under Secretary, Mr. Robert Wilson; the Director of Agriculture, Mr. H. C. Quodling; the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Forster; the Chief Inspector of Stock, Major A. H. Cory; the Acting Director of Fruit Culture, Mr. George Williams; the Chief Supervisor of Dairying, Mr. E. McGrath; Mr. W. A. Adcock, and the Secretary of the Royal National Association, Mr. J. Bain.

## THE MEAT INDUSTRY EXHIBIT.

### AN EDUCATIONAL EYE-OPENER.

The importance of the meat industry in its present condition of primary production and home consumption was brought home to everyone who had the good fortune to see the wonderfully complete exhibit in the new Meat Hall at the Exhibition Grounds. The real educational eye-opener, however, was the extraordinary range of the utilisation and manufacturing sides of the industry it illustrated, and it may be fairly claimed that no one left the Meat Hall without at least some vision of pastoral possibilities in Queensland and the meat industry as a basis for widely embracing home manufactures. The interdependence of primary and secondary industry could not have been exemplified more impressively, and the exhibit had its lessons, not only for producers but to statesmen as well. As an industrial trophy it was a triumph, and all concerned in its organisation and display won warm public appreciation.

### THE EXHIBIT DESCRIBED.

As the visitor entered the main door he was struck by a slogan which strongly described all the exhibits in the building. "The outcome of scientific and industrial research which shows the signs of approaching its ultimate boundaries." On the top of this slogan there was the Australian coat of arms, the flag of our land, and the head of a bullock.

The most prominent feature was a refrigerating case, designed by Willsbridge and Sinclair, Limited, to stress the importance of the application of mechanical power in refrigeration, to which the development of the live stock and meat industry in Australia has been largely due. Exhibited in a most attractive manner within the case were sections devoted to lamb, mutton, and pork, and a lightfoot (chicken) refrigerator installed by Willsbridge and Sinclair, Limited, was in operation day and night.

### Mutton and Beef Sections.

In the mutton section the exportable qualities were shown, and a demonstration given of the economical cutting of carcasses, mutton and lamb. This section was of great educational value, showing, as it did, how to secure the utmost value from the carcass and at the same time give to consumers the choicest cuts. Small goods, such as tongues, trotters, ribs, kidneys, brains, and so on, short ribs, necklets, and neck chops, formed an attractive embellishment to what was unquestionably the finest mutton display that has ever been seen in Australia.

In the beef section American exhibition methods had been copied with advantage, and the cuts employed in the famous Southfield meat markets, London, were prominently shown. A complete side of beef was displayed in a prominent position, and the representing demonstration directly lines one from a bullock which, in general principles, represents our export trade. In addition to the main sectional cuts of butt, rump, loin, rib, and chuck, there was an exhibition of round rump, Porter-house, and sirloin, while the bigger joints were represented by silverside, skirt, brisket, rolled etc.

standing rib, and brisket. The smallgoods subsection was also very interesting, ox tongues, brains, sweetbreads, hearts, kidneys, thick skirts, and so on being shown. It was a demonstration of the technique of cutting, and taught the lesson that producers must keep up the quality for the home and export markets.

### Pork Exhibit.

There is a tremendous co-operative interest in the pork industry in Queensland, and the splendid exhibition of products from what is described in the Meat Industry Hall as "The noble vertebrate" was an education to all those interested in pig-raising, and the general public also learnt many things it did not know. Sides of the pig were attractively displayed in a semi-circle. A full carcase of the animal was in the centre, and the cuts—cheek, cushion, rib, chops, loin, leg of pork, and the hand and spring were shown, together with cutlets, kidneys, trotters, and so on. A humorous touch was introduced. Three porkers, reclined on a bed of grass, oblivious to the interest that visitors to the Show were taking in their slaughter. A ticket asked visitors to "Please go away and let us sleep."

Over the refrigerating-room, 30 feet by 8 feet, there was a striking pictorial display in cut-outs of pure breed baby beef cattle, the Hereford forming the two centre pieces, flanked on either side of the polled Angus and the Shorthorn. The artist succeeded in making these cut-outs very life-like. There was no mistaking the youth of the beasts, which represented the absolute standard of perfection of their type—the stars to which all breeders must hitch their waggons.

### Meat Industry Board's Display.

Another very fine exhibit was that of the Meat Industry Board of New South Wales. The public abattoirs at Homebush Bay, Sydney, were represented by a diorama of striking beauty. The visitor was told, by attractive posters, that the Homebush Abattoirs is not a State concern. There is slaughtering and killing accommodation for all the butchering interests of Sydney, as well as facilities for supplying the killing and refrigerating needs of the New South Wales export trade. Situated within 1,600 acres of pastoral land, there is ample space for the resting of sheep and cattle. The Meat Industry Board claims that it has the largest by-product works associated with any public abattoirs in the world. One was told, further, that "the magnitude of the by-products treated at Homebush is due to the concentration of killing." Many of the by-products are absolutely unprofitable in small quantities, and can only be treated economically in a works which has a daily capacity of 1,500 cattle, 20,000 sheep, 3,000 pigs, and 2,000 calves.

### Using By-products.

Among the by-products which are saved at Homebush and profitably treated are the pituitary, thyroid, and other glands, which provide the manufacturing chemist with raw material for the treatment of hypertensive and prostrate diseases of the human race. Rennet for the manufacture of cheese is another by-product which is rapidly capturing the export trade, and is very much appreciated on the other side of the world. Meat concentrates for the feeding of dairy stock, poultry, pigs, and sheep are prominently featured, and the Homebush Abattoirs claim to have led the world in this part of the industry. It claims to be the only meatworks in the world which has a specialised department for this work. Casings is another important by-product, and there is a wide range of dried gut products, power gut for the transmission of power in sheep-shearing and other machines, tennis racquet gut, violin strings, surgical gut, gold beater skins, and so on. It was a unique exhibit, and the whole arrangement was quiet and dignified, a colour scheme of blue and gold predominating. Revolving spheres symbolised the importance to civilisation of the meat industry in Australia. A striking pictorial centre-piece depicted the 1926 sheep dog trials at the Royal Agricultural Show in Sydney. Particular stress was laid on the fact that the Homebush Abattoirs is not a State enterprise, but a public utility, which aims at assisting the meat industry, without disturbing the law of supply and demand or hampering initiative or free competition. Among the by-products from cattle and sheep were tallow, oils, casing, fertilizer, meat extract, olio, stearine, olein, hair for the brush trade, and bone products of all kinds.

### Trade Exhibits.

On the main background was a range of striking trade exhibits—domestic and toilet soaps, showing the process of milling and plodding soap, its cutting and pressing into tablets ready for sale; sheep and cattle leathers, in rainbow hues, indicating the many uses to which fancy leathers are put, cushions, table centres,





PLATE 61.

*Top*—Hacks and Ponies parading for Judgment.

*Bottom*—Some of the Cattle in the Grand Stock Parade.



PLATE 62.—UP FOR JUDGMENT!

*Top*—Ayrshire Sires undergoing a Critical Scrutiny.

*Centre*—Jerseys were Strong Favourites.

*Bottom*—Shorthorn Aristocrats from Fashionable Families.



wallets, ladies' handbags, boots, and shoes. The woollen exhibits showed the process of manufacture from the time the wool is taken from the sheep's back until it is turned into finished suitings or flannel. The intricacies of the weaving industry were shown in a revolving pyramid of flannels, in many colours—blankets, rugs, suitings, and dress materials were displayed.

Margarine was exhibited prominently, and the visitor shown the uses to which animal oils can be put. There was a wide range of boot and shoe exhibits, showing the technique that is now employed in the manufacture of leather in Queensland. The visitor had only to examine the examples of Australian leather-wear critically to realise that the product of our factories outrivals the productions from the famous French and American factories. Canned meats were exhibited, and the process explained. Among the stock foods was an exhibit of "Kube," a new sheep food, which keeps flocks alive in drought time. On the opposite end of the hall to the refrigerating section, there was a very fine diorama of Swifts' works on the Brisbane River, with a view of the picturesque country in the distance, and a steamer lying at the wharf. In the pig industry section—the display dedicated to "the noble vertebrate"—the importance of the bacon industry was stressed in a manner that had not been attempted hitherto. All the main cuts, such as hams, middles, sides, flitches, and rolled bacon, formed the centre of a colourful display. Small goods, oils, and brawns flanked the two sides, while tinned meats were represented by tongues, camp pie, sandwich meats, and by-products of the hog house. Leathers—saddles, travelling bags, fertilizers, tallow, and crude oils, were also exhibited.

### **An Education—"Run Australian Industry on Australian Ball Bearings."**

Of great educational value was the display showing the dependent and interwoven products of the meat trade. The diversity of the leather industry, and its close association with the live stock business, was stressed in a remarkable manner. There were beautiful examples of tan and black box yearling leathers, raw hides, yearling tan, willow calf, black willow calf, tan sole leather and chrome sole leather, belting for machinery, and laces of all kinds. A demonstration of shoemaking was given, and the tanning process was shown by actual examples of the hide in its transition from the raw material to the finished article. Glue, in association with the head and leg pieces from which it is derived, was exhibited in many forms, and several important grades of premier juice and tallow indicate the great importance of the fat and oil of bovine stock. Another interesting feature showed how the hoofs of cattle are decolourated and Prussian blue is obtained in the process, this colour being the base of our common washing blue. From the hoofs, buttons, combs, shaving brushes, and scores of other articles are obtained. On the opposite side of the centre-piece was an attractive soap exhibit, and gelatine, which was made from the sinews, and medicinal products derived from glands were also shown. Among the bone products were combs, knives, forks, spoons, shaving brushes, tooth brushes, knife handles, and the like, and the use to which bone is put in the hardening of steel was also stressed. The bone is subjected to terrific heat in order to give a deep carbon penetration, which makes possible the use of ball bearings in high speed machinery. Associated with this section was a slogan: "Run Australian industries on Australian ball bearings."

### **Sheep Industry.**

The sheep industry was represented by a woollen centre piece, in which there was a fleece from the famous Glengallan Station, taken from sheep imported into Australia by the late J. B. Bettington, of Hunting Park, New South Wales, in 1842. Around it were the drawings, twistings, robings, and spinnings of the worsted process. Sheep leathers in many forms were also displayed, as well as glue, soap, gelatine, tallow, mutton, stearine, and medicinal products from the thyroid gland, lanoline and products, oil, glycerine, animal foods made from kibbled bone meal, meat meal, bovaline, ovavita, bone licks, and soap. There was an interesting display of Japanese soap made from Australian tallow. The packing is a close imitation of European methods. Boxing gloves, cricket pads, wicket-keeper's gloves, tennis racquets, gold club grips, and hundreds of other articles show how wonderfully science has helped industry, and how many useful articles are made from by-products which, not many years ago, were thrown away as useless.

### **Three Important Points Strongly Impressed.**

This magnificent display of subsidiary meat industries impressed forcibly on the mind of the visitor three points:—**They provide a better price for cattle on the hoof; they lower the price of meat to the consumer, because, if they were not availed of, the revenue derived from them would have to be obtained directly from the consumer of edible meats; and their manufacture is playing no small part in making Australia a self-contained nation.**



PLATE 63.—THE "JOURNAL" ALCOVE.

A useful innovation in the Court of the Department of Agriculture. In the course of the Show the Bureau, in charge of Mr. Wilkie Lewis, became a recognised clearing house for Departmental information



## THE AGRICULTURAL COURT.

### REPRESENTATION AND REVIEW OF DEPARTMENTAL ACTIVITIES.

The Department of Agriculture and Stock again presented its annual display of primary products—tropical, sub-tropical, and temperate—together with striking examples of the work and progress of its highly trained and skilled scientific and technical services. Its agricultural extension efforts and effective publicity agencies were also fitly illustrated. In fact, the Departmental Court was really the Department itself in miniature, and even the most casual observer must have been impressed with the vast importance to the State of its wide-spread administrative and instructive activities.

Several sub-departmental sections contained excellent examples of the close attention bestowed on field and laboratory problems by departmental officers, and these included illustrations of the results of scientific research and field effort associated with Wool, Queensland Natural Grasses, Sugar, Wheat Breeding and Cultivation, Maize, Cotton, Dairying, Pig Raising, Poultry Farming, Power Alcohol Production, Broom Millet, Peanuts, and other crops, Entomology, Plant Pathology, and Publicity.

All these were arranged in practical order, and the wealth of Queensland soils and pastures was appropriately symbolised in striking trophies of artistic design, and set within the quadrangle in such a way as to compel attention and evoke admiration.

The colour scheme of the Court this year was a vellum tint and grey relieved with gold. Between each trophy were columns in stone supporting arches with light asparagus festooning. Palms and ferns added to the beauty of the decorative design. The experience gained at many international exhibitions, including Wembley and more recently the South Seas Exhibition at Dunedin, as Queensland representative, by the designer and display officer of the Court, Mr. H. W. Mobsby, F.R.A.S., F.R.G.S., was evident in the tout ensemble. He had to visualise the whole lay-out and design the floor plan and elevations of each setting for the display of products. His aim has been to make the Court each year, if possible, better than the last and thoroughly representative of the advance in Queensland agriculture in which the Department, under the direction of the Minister, Mr. W. Forgan Smith, takes a strong lead. The Department of Agriculture and Stock has now become one of the most important administrative and directional services in the State.

A new court feature this year was an Information Bureau, representing the Publicity Section and the "Queensland Agricultural Journal," at which was in attendance an officer who arranged interviews between visiting farmers and departmental specialists, and attended generally to the wants of the inquiring public.

### CEREAL CROPS—EVOLVING NEW TYPES.

#### Maize.

The central feature at the Court of the Department of Agriculture and Stock was devoted to Queensland's principal cereal, maize. On this trophy was seen possibly the most comprehensive display of the kind ever shown at the Royal National. The quality, type, and uniformity of the grain afforded a striking example of what has been accomplished by the departmental maize specialist (Mr. C. J. McKeon) by scientific seed selection, a reflection of which was seen in the splendid exhibits of maize in the competitive sections at the Show. Each exhibit on the trophy was accompanied by descriptive labels setting out the fundamental principles of seed selection, which the grower can readily follow. Added interest was afforded by the knowledge that the Department makes a practice of supplying pure seed of these varieties to growers. One of the most significant exhibits illustrative of the valuable work accomplished by the maize specialist was the new variety, Durum maize, specially bred to meet the exigencies of the climate on the Atherton Tableland. In this locality one of the principal difficulties is to produce grain resistant to a form of mould (Diplodia), and of sufficient hardness and good keeping quality. So far the new strain has maintained the characteristic hardness of one of its parents, flint corn, and was exceptionally free this season (a reputably wet one) from Diplodia. A seed maize improvement scheme is being conducted by the Department on the forest country in the Atherton district with the object of propagating supplies of seed for local distribution from next year's crop.

#### Wheat Breeding.

This display dealt specifically with varieties of wheat bred at the Roma State Farm by the manager and wheat breeder, Mr. R. E. Soutter; also with other varieties from the Southern wheat-growing States, which have proved suitable for general

cultivation in Queensland. Centrally disposed on the exhibit was a chart of a wheat classification scheme prepared by officers of the Field Branch, which set out varieties recommended for planting in different districts; their period of development—early, medium early, mid-season, and late maturing; the correct period of planting; the soils that individual varieties are most suited for; and the texture of the grain of each kind of wheat. The chart in reality is a guide to growers. The important work of breeding varieties to suit Queensland conditions has been carried out by the Department for upwards of twenty years, and good work has been accomplished. Sixty per cent. of the wheats enumerated on the chart are departmental varieties.

### Pure Seed.

Officers of the Field Branch are closely associated with the testing each season of a large number of new strains bred at Roma, which are tried out under different environment in a number of districts where their resistance to rust and field characteristics are made the subject of close observation. To conform to the standard required, "crossbreds" are tested from year to year, to gradually eliminate the unfit. Closely associated with this work is a scheme for the propagation of supplies of pure seed under an arrangement made between the Department and the Wheat Board, which pays a premium to growers who co-operate and undertake to deliver a proportion of their crop to the Board. In this way the purity and type of approved varieties are maintained, and supplies of clean and graded seed are thus available for further distribution, by which latter arrangement the more dependable kinds are gradually brought into cultivation. One very promising strain—combination of Cretan, Bunge, and Gluyas, which has stood out prominently in the field tests and is also resistant to rust—has been put into cultivation this season, and named "Duke of York," to synchronise with and to commemorate the date of the Duke's visit to Queensland.

## OTHER PRODUCTS.

### Northern-Grown English Potatoes.

The northern parts of the State are largely dependent on Southern-grown potatoes which are periodically shipped to suitable ports. An effort has been made by the Department, through its Northern Instructor in Agriculture, to encourage potato-growing with the object of making the North more self-supporting in the matter of its food crops.

Greater interest is being shown in English potatoes than formerly, and an increase in the area cropped is gradually taking place. Owing to climatic conditions in the more tropical belt the crop is grown in the autumn and winter. On the Tableland the planting seasons synchronise more or less with those of Southern Queensland. To keep up a continuity in the supply of seed a method of alternatively planting it on the Tableland and coastal land is being tested out.

Experiments in the cool storage of special varieties of seed potatoes have also been successfully carried out. In the variety trials conducted by the Department, where upwards of fifty different kinds of potatoes were grown, yields of several tons per acre were not uncommon. Some excellent samples were shown.

### Yams.

Five different samples of North Queensland-grown table yams were on exhibition, comprising the following varieties:—South Sea Island, Rabaul, Trobiand, Mamie, Millie.

Although not grown in commercial quantities, yams of good flavour and quality are relished by those who are familiar with their use.

### Wilt-Resisting Tomatoes.

The Bowen district supplies the Southern markets with large quantities of tomatoes which, in favourable seasons, exceed 200,000 cases per annum.

The Northern-grown crop is marketed before the Southern tomatoes are ready, with the result that prices are usually fairly good. Prior to the introduction by the Department of "wilt-resistant varieties" heavy losses were sustained by Bowen growers. The Northern Instructor in Agriculture (Mr. N. A. R. Pollock) has taken a keen interest in the introduction, testing, and subsequent distribution of seed of several varieties of tomatoes, which have been more or less adopted as standard, wilt-resistant types, the good flavour and carrying capacity of which have established an excellent reputation for Bowen as a tomato producing centre. The kinds in favour are Bowen Buckeye, Denisonia, Norton, Norduke, Columbia, and Moselawa.







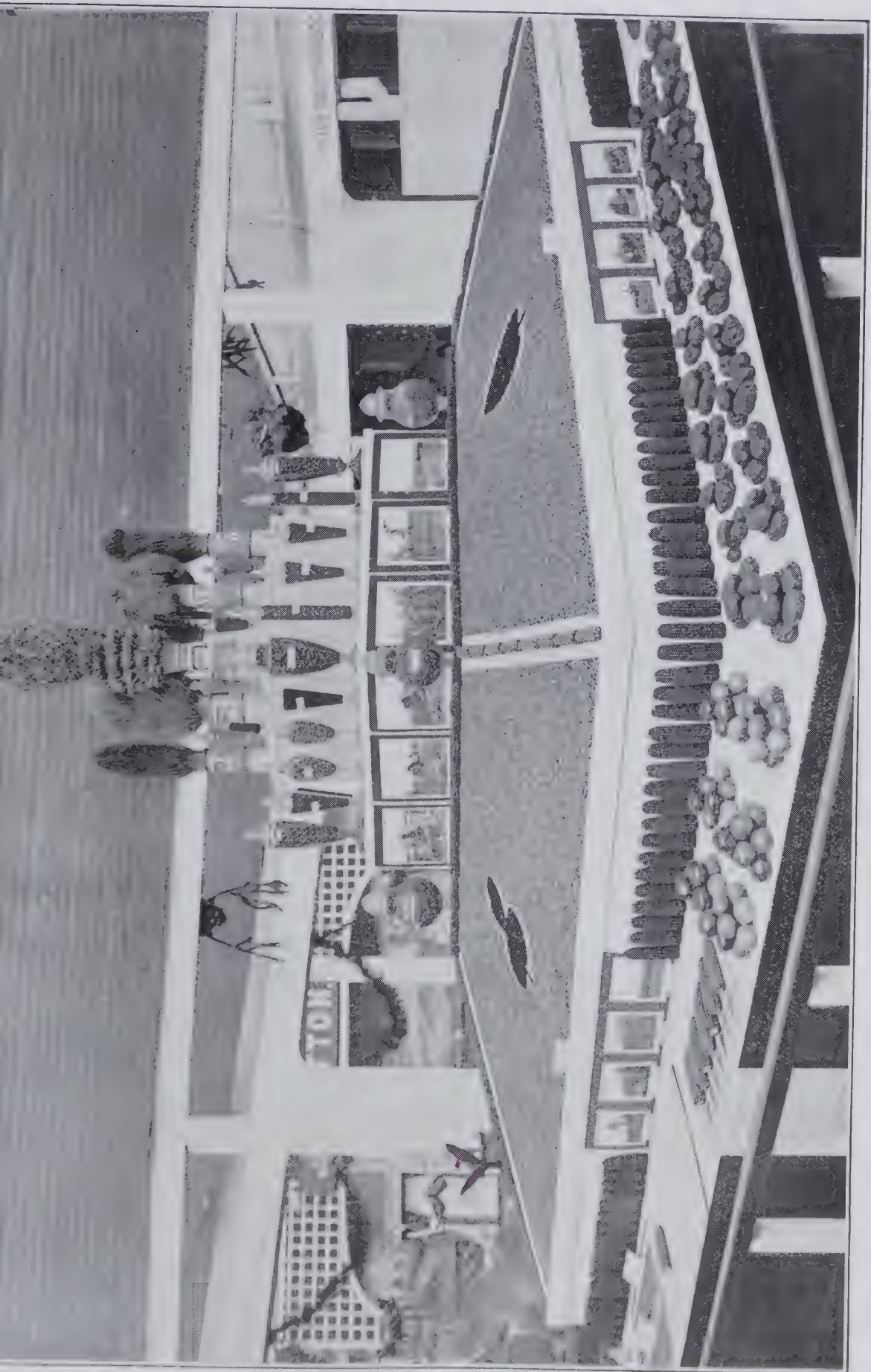


PLATE 65. MAIZE IS KING. THE BEAUTIFUL CENTRAL FEATURE OF THE COURT OF THE DEPARTMENT OF AGRICULTURE.

This was regarded by experienced judges as one of the finest maize exhibits, from point of view of quality of grain and educational value in respect to seed selection, ever staged at an Australian show. The work of the Director (Mr. H. C. Quolling) and Field Officers of the Agricultural Branch, as illustrated by this and other excellent Court features, won widespread favourable comment from visiting farmer and others interested in rural progress.



**Broom Millet.**

The recent Commonwealth embargo prohibiting the importation of Broom Millet to prevent the introduction of the European corn borer, an insect the cause of widespread destruction in other countries, has given producers an added interest in this crop. A shortage of supplies manifested at the end of last season caused prices to rise and acted as an additional incentive to growers whose product is now marketed under the existing pool system.

It is recognised that bountiful summer rains and the existing favourable climatic and soil conditions are contributory to the production of good quality fibre in Queensland. Unfortunately, many growers have shown indifference in the curing, classification, and get-up of their product, with the result that an industry which appeared directly capable of expansion is experiencing a pronounced check.



PLATE 66.—AN EDUCATIONAL EXHIBIT IN THE DEPARTMENTAL COURT.

Queensland grows her own millet and makes her own brooms—an advancing industry which illustrates the inter-dependence of healthy primary and secondary enterprise.

The primary essentials in working up a trade and extending it are to create a demand for goods of standard quality and of attractive appearance, and additionally to maintain supplies when repeat orders are received.

The short-sighted policy of growers in forwarding unclassified, discoloured, badly graded, irregular bundles similar to that on exhibition, which had been taken at random from the State Produce Agency's floor at Roma street—which is acting on behalf of the growers' own representatives on the Broom Millet Pool Board—is simply jeopardising prospects of finding and keeping suitable markets for Queensland's surplus broom millet.

To try and bring home the seriousness of the present position the Department exhibited a well-classed bale of millet alongside of the sample bundle referred to. The former class of bale can safely carry a distinctive brand and will command attention in any market. It was specially pressed for the purpose by one of the Departmental Agricultural Instructors within a rough timber framework, the pressure being supplied by a Wallaby Jack, a method of preparation within every growers' reach.

To make the Broom Millet exhibit as educational as possible a range of samples from one of the Department's experiment plots was displayed, and served to show the different grades and lengths of fibre into which a crop should be classed; also the kind and character of brush necessary when seed heads are being selected.

Officers of the Field Branch of the Department have been engaged for some years in the improvement in the yield and quality of Broom Millet fibre, which can only be brought about by adopting a system of rigid selection.

### NATIVE GRASSES.

The value of wool exported from Australia for the last five years amounted to the grand total of £258,357,070, and practically all this wealth was primarily derived from indigenous grasses and pasture plants. If we add to wool the value of beef, mutton, and dairy products, the great value to Australia of good pastures is at once apparent.

Queensland's natural pastures are unrivalled, as the collection of grasses staged by the Department bears testimony.

There is no doubt that, with the extension of the grazing industries, the better grasses in some of the more closely settled areas have been eaten out, allowing coarser, less palatable species to grow; and the problem of pasture improvement is one worthy of research. A great deal can be done in the way of pasture improvement by judicious stocking and conserving and propagating the better species such as the Mitchell Grasses, Flinders Grass, Native Panic Grasses, &c.

Among the Andropogons exhibited with other specimens in the Departmental Court were the far-famed Blue Grass and the Satin Top, the former being one of the very best for fattening and grazing purposes. The genus *Astrebla* comprises the highly esteemed Mitchell Grasses, of which four very distinct kinds are found in Queensland. The chief characteristic of these and some other inland species of grasses and herbage is not only their drought-resisting properties, but also the rapid way in which they respond to falls of rain after long periods of drought, their value in this respect being nothing short of marvellous. Among the Star Grasses, to the same genus of which belongs the imported Rhodes Grass, are several sorts esteemed for their fodder value. The genus *Anthistiria* contains the well-known Kangaroo Grass and a near ally of this is the Flinders Grass which, both in a green and a dry state, is so much relished by stock. Quite an array of Panicums or Native Panic Grasses were on view, most of these grasses possessing high feeding values. Beautiful grasses and at the same time useful in the native mixed pastures are various species of *Eragrostis* or Love Grasses. The Button Grass and the Crow Foot are cosmopolitan species; the first mentioned is a most valuable sheep grass. Brown Top bears a good reputation among some stockowners. Several species of native *Paspalum*s were shown, some being of high food value, particularly for tropical parts. The native *Sorghum*s are coarse grasses, but when cut or grazed down, both horses and cattle do well on them.

The fact was impressed on visitors to the Show that the Department is always willing to identify and report on any specimens of grasses and other plants. Specimens may be sent to the Department of Agriculture and Stock, or direct to the Government Botanist.

### POWER ALCOHOL.

Australia needs to be concerned in its fuel supplies for internal combustion engines when the fact is made known that the annual consumption of petrol in the Commonwealth is 124,000,000 gallons, 70,000,000 of which are imported from U.S.A. and 54,000,000 from the Dutch East Indies, and this huge consumption is on the increase.

Notwithstanding efforts made to locate petroliferous supplies in Australia and New Guinea, appreciable quantities are not yet available. Investigation and exploratory work is still proceeding with good prospects of ultimate success.

The commendable action of the directors of the Plane Creek Sugar Mill, at Sarina, in spending £120,000 in the erection of an up-to-date plant for the distillation of Power Alcohol from Molasses, and its adaptation for use when required for





PLATE 67.—QUEENSLAND'S WEALTH IN NATURAL PASTURES ILLUSTRATED.

An attractive panel in the Court of the Department of Agriculture. The total value of Australia's Wool Exports for the last five years amounted to a grand total of £258,357,000. Practically all this wealth came primarily from our rich indigenous grasses.





PLATE 68.—THE FUEL OF THE FUTURE—OIL FROM THE SOIL.  
A new industry in the making. This panel of Tropical plants and their products was one of the most instructive exhibits in the Departmental Court.



the treatment of starch-producing crops for the same purpose, ranks as one of the most recent important industrial undertakings in the State. Operations were commenced in January this year.

Apart from certain financial assistance rendered by the Government to the company concerned, the Department of Agriculture and Stock has closely associated itself with the production of Cassava and other starch-producing crops. Last year an officer was sent to Java to study cultural conditions applied to cassava growing, and his mission also was to arrange for shipments of cuttings for planting out in the neighbourhood of Sarina.

One million cuttings of different varieties were subsequently imported and planted. Experiment plots for the carrying out of comparative trials and for the

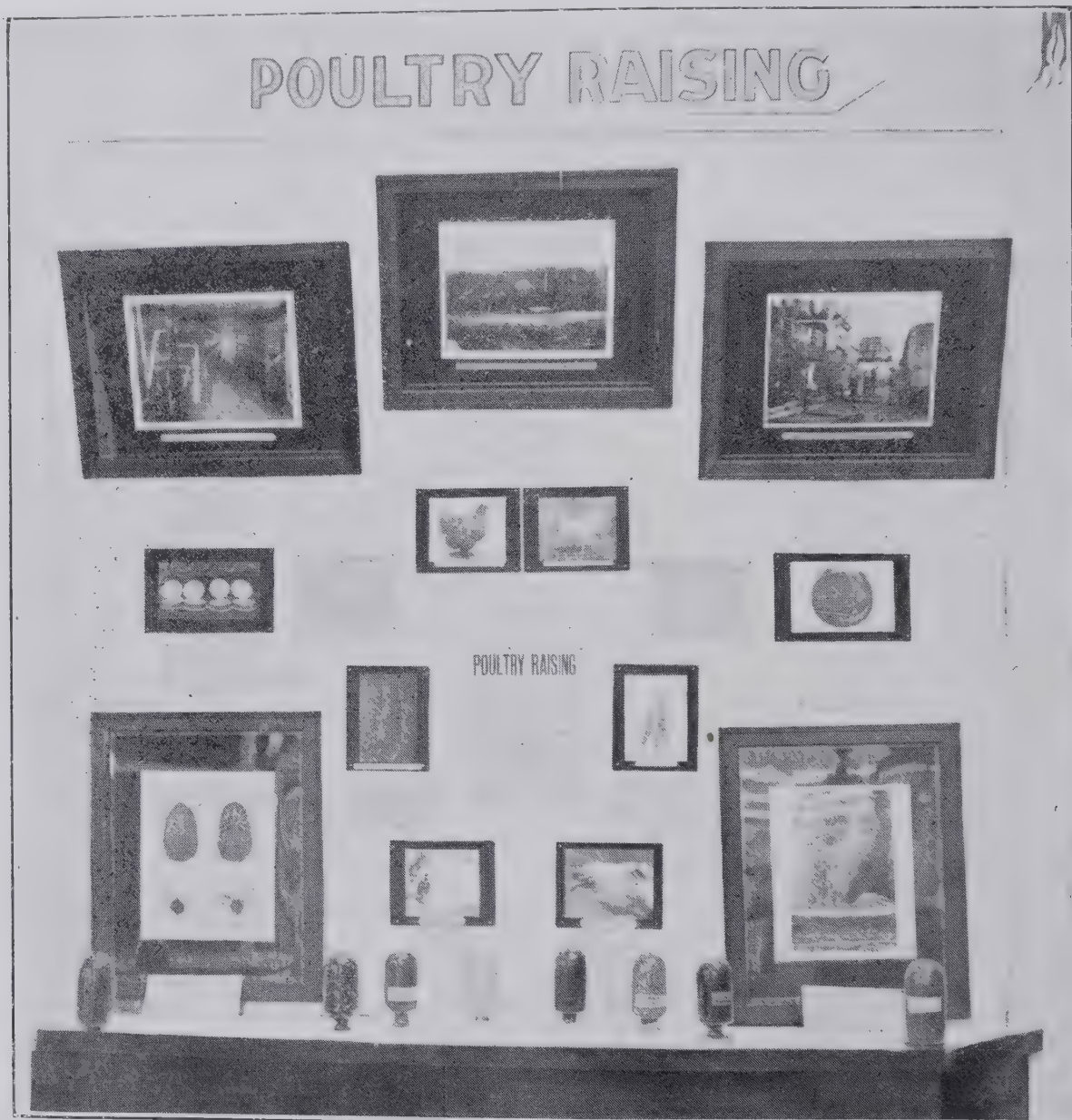


PLATE 69.—AN ILLUSTRATION OF DEPARTMENT'S EDUCATIONAL WORK.

Poultry raising is now recognised as one of the best farm side lines, and is approaching the status of a staple industry in Queensland. Its annual value to State is approximately £700,000, estimated conservatively.

testing of special varieties of Cassava were established. Other starch-producing crops, in the way of Arrowroot and Sweet Potatoes, are also undergoing trial. Data is not yet available to determine whether Cassava can be grown and utilised on an economic basis for Power Alcohol production. Some excellent crop yields were obtained at the various experiment plots, and plans have been formed to extend operations. All these activities were illustrated strikingly by a most instructive display of products and processes in the Departmental Court.

### POULTRY.

In the Departmental Poultry Exhibit, Egg Laying Competitions were featured with the object of bringing out the points of careful breeding, which is necessary in the first place to make poultry profitable.

Another illustration was that of the Mammoth Incubator. A fine range of photographs showed the industry in its varied operations. Producers could learn from the exhibit that it is possible for them to buy stock from reputable breeders, thereby increasing the general productivity of their flocks without adding to the general labour on the farm.

The export of eggs was well featured. The growth of the industry has been remarkable during the last few years, necessitating heavy overseas export. The quality necessary was illustrated by a picture of the germ development of the egg. The poultry tick and its ravages also received prominence in the display. Pictures of this pest through its complete life cycle were shown, and when it is known that it is responsible for a loss to the poultry industry in Queensland of over £50,000 per annum, the prominence given to the question of the tick could be understood. Common diseases of poultry, and their more or less simple treatment, were also illustrated in an exhibit of high educational value.

### QUEENSLANDS' WEALTH IN WOOL.

Many excellent exhibits of Queensland's great staple industry were included in district exhibits. The Department of Agriculture and Stock had a magnificent display in its Court, in which a highly educative trophy based on fleeces and pieces, arranged by the Instructor in Sheep and Wool, Mr. W. G. Brown and his assistant, Mr. J. Carew, was a conspicuous feature. Experts, both of the run and the wool room, were immensely pleased with its appearance and comprehensiveness. It was most elaborate, and wool information and samples were so tabulated and arranged as to convey to even the casual observer an idea as to the stages in sequence of converting wool from its greasy state to the finished fabric. Queensland being probably the finest Merino country in the world, samples of this wool predominated naturally. Coastal and crossbred wools were also displayed to advantage. All were bright, clean, fine up to superfine, and high-yielding—most attractive wools of the highest quality. "As good as any fleeces the Department has ever handled," was the verdict of Mr. Brown.

In the several district exhibits wool was a prominent feature. The numerous entries and fine exhibits indicated strongly the increasing bias of farmers and small holders generally towards sheep raising as an adjunct to their other undertakings. Wool in the Departmental Exhibit prepared by Mr. W. G. Brown were all typical Queensland wools, shown according to district of origin.

The operations of the Departmental Wool Scheme are extending rapidly. It is of great advantage to the smaller holders to have their wool handled well, and put in an attractive form before the buyers, and this work was well illustrated.

Other striking evidences of the activities of the Department in the Wool and Sheep Branch were well presented. Lectures, by radio and otherwise, practical advice and land inspection are all routine matters in this Branch.

### SUGAR INDUSTRY.

#### Display by the Bureau of Sugar Experiment Stations.

The cane exhibited this year by the Bureau of Sugar Experiment Stations included a number of varieties from Hawaii, West Indies, Java, India, Mauritius, Fiji, and Queensland. The Queensland canes included a number of new varieties raised from seed at the Sugar Experiment Station at South Johnstone. Up to the present about 7,000 of these seedlings have been raised, but many of them, of course, are weeded out in the process of selection. Commercial trials of the best of them are now being undertaken. One of the objects of the Sugar Experiment Stations has been the introduction and testing of new varieties. Before any cane varieties are allowed to leave the Experiment Stations they have to pass chemical and commercial trials through plant, first ratoon, and second ratoon crops.

Each variety is tested not fewer than four times in the course of the sugar season, so that records are obtained giving farmers and millowners information whether canes are early or late, and whether their sugar contents are sufficiently high to warrant their adoption. This is combined with agricultural trials in the field, so that it may be determined whether such varieties are good croppers. They are further keenly watched for evidence of disease, and no affected canes are allowed to go into distribution. When varieties have passed these trials they are carefully examined and packed before being sent to growers living at a distance





PLATE 76.—Flocke used for woolen fabric. A view of the wool room in the woolen factory.



PLATE 71. WHITE AUSTRALIA'S "WHITE HOPE".  
Queensland's progress in cotton culture was illustrated in this artistically arranged exhibit in the Court of the Department.



from the stations. All canes are distributed free to canegrowers. The worthless varieties are discarded. Information of this kind could only otherwise be secured by growers and millers at the cost of much time and money, and the rejection of many useless canes by the mills, which would be accompanied by severe loss to the growers.

Full descriptions of the varieties exhibited appeared on the cards attached to the canes, which also give commercial cane sugar content. Many of these canes are at present undergoing chemical and field tests, while others have passed the probationary period and are being distributed to canegrowers. These varieties, however, included a very small part of the number of new and tested canes that have been distributed from the Experiment Stations in the course of the past twenty years.

### **Sugar-cane Propagation.**

The Sugar Experiment Station at South Johnstone, near Innisfail, has, during the past six years, been engaged in the direction of raising cane from the seed found in the arrows. This requires the utmost care, as the seed is very minute and has to be handled most carefully. Specially prepared boxes of soil are used, which have previously been sterilised. The cane arrows, when mature, are gently broken off, spread over the soil, watered, and then covered with glass plates. When germination takes place, a large number of minute shoots like grass appear. When these have made further growth they are carefully pricked out into pots or boxes, and are ultimately removed to the field. Several of them which were taken from Badila cane have Badila characteristics, and it is trusted a cane equal to the Badila will be discovered.

### **Study of Soils.**

Work at the Experiment Stations also includes the study of soils, cultivation, and fertilizing. It is sought to introduce improved methods of cultivation, liming, fertilizing, rotation of crops, and conservation of moisture, and growers are taught the principles of cultivation methods by visits to the Experiment Stations, by lectures and addresses delivered in the various sugar districts, and by the issue of bulletins. It is claimed that this work has been highly successful. The Sugar Experiment Stations analyse soils free for canegrowers, and give advice by personal interviews or by letter, on the requirements of the soil in the way of application of lime where necessary, green manuring and fertilizers, and the treatment of the land by proper soil handling. Upwards of 1,500 cane soils have so far been analysed. Cane samples are also tested free of charge, so that growers may know the best time at which to cut their cane. Field officers move around amongst farmers, giving advice on cultural operations.

### **Investigation and Research.**

Investigation and research work in connection with the most serious pest of the sugar-cane, namely the grub, is now being carried out by the Bureau of Sugar Experiment Stations in a systematic manner, and numerous bulletins have been issued upon the subject. The entomological laboratories are situated at Meringa (near Cairns), and at Bundaberg. Chemical fumigants are being successfully used in the destruction of cane grubs. A pathological staff is being established to deal with diseases in cane, and travelling pathologists are advising cane farmers on disease questions.

The work of the Sugar Experiment Stations, in relation to the promotion of the agricultural welfare of Queensland, cannot be over-estimated. When it is considered that this industry is the greatest agricultural one in Queensland, and will produce about 430,000 tons of sugar this year, estimated to be of the value of over £9,000,000, it can be seen how highly necessary it is that it should be assisted and encouraged in every possible way. Apart from its economic value, however, it has a deep national significance, and has already played a very large part in peopling the North.

### **Sugar Belt.**

Apropos of the sugar industry, it is to be noted, on reference to a map of the State, that the land in Queensland used for sugar-growing is included in a long narrow coastal belt. Parts of this belt are separated from each other by considerable tracts of non-sugar country. The latter, owing to a deficient rainfall or poor-ness of soil, are not utilised for cane. This belt is included between latitudes 16 degrees and 28 degrees south, and the bulk of the staple is grown within the tropics.

### Rainfall.

The Queensland rainfall fortunately is highest during the summer period, at which time the cane plant makes its maximum of growth. The following are average rainfalls in the principal sugar-growing districts:—Cairns, 92.65; Johnstone River, 160.88; Herbert River, 84.91; Mackay, 66.67; Bundaberg, 44.40. Cane grows best when the relative humidity of the atmosphere is high, and this is the case during the wet season in Northern Queensland.

Queensland's sugar production in 1867 was 338 tons, and in 1925 reached 485,000 tons, the record crop to date.

The yield of cane and sugar per acre is improving, due to better methods of cultivation and growth of superior canes. The mills have also largely increased their efficiency, and over £1,000,000 have been spent during the past five years in improving existing mills, while, in addition, the Queensland Government have erected the most up-to-date sugar plant in Australia in the Tully River district.

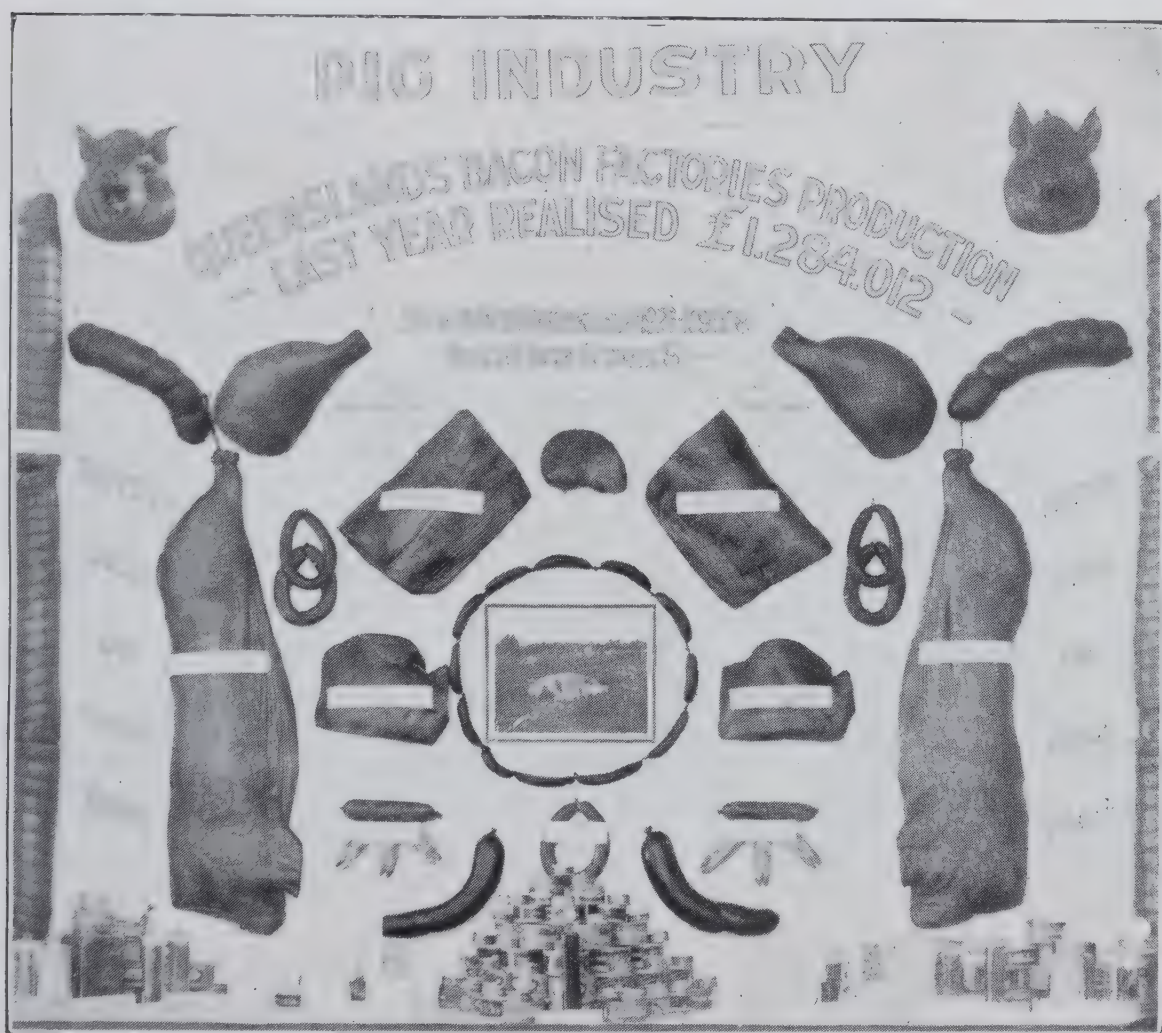


PLATE 72.—PIGS FOR PROFIT. THE DEPARTMENT'S EDUCATIONAL WORK ILLUSTRATED.

### PIG RAISING.

From a financial point of view the pig industry at present represents, in round figures, a return to the State of well over £1,250,000 sterling annually, and the returns are increasing every year. That it pays to follow Departmental advice and breed more and better pigs on every farm is being advocated widely in every district throughout the State. Mr. E. J. Shelton, Instructor in Pig Raising, and his assistant, Mr. F. Bostock, again staged an instructive and attractive display in the Departmental Court, featuring the great variety of products manufactured or obtained from the carcass of the hog. The exhibit included the ordinary commercial products, hams, sides of bacon, flitches, shoulders, middles and rolls, arranged around a central enlarged photograph of a profitable and prolific breeding sow and her family not yet ready, but en route to the consumer's plate. Along with these products were shown numerous manufactured lines, including Strasburg and Devon sausage, ham delight,



and other varieties of small goods, pure lard and lard oil. Included in the canned goods section were camp pies, luncheon tongues, pork brawn, pork and beans, sandwich delicacies, and the like.

Surmounting the display was an attractively worded display scroll, indicating what Queensland's pork and bacon industry is worth to the State, while the total number of pigs in the State was also given. At the base of the display of manufactured lines of edible products were numerous inedible lines, including pig hair, glue pieces, trotters, sausage casings, blood and bone meals, and so on.

### Display in Meat Hall.

Included in the great variety of products displayed in the new Live Stock and Meat Industry Hall was a comprehensive display of the products of the pig arranged by the Instructor in Pig Raising and his assistant, with the co-operation of representatives of the various bacon factories and the State butcheries. The display of fresh pork products, specially prepared and arranged under the supervision of Mr. Brunekhurst, the manager of the State butcheries, included every line catered for in the fresh pork trade as prepared from the carcasses of prime-quality porkers, such



PLATE 73.—IN THE RING

Seated in the centre is Major-General Spencer Browne, the veteran horse judge who commanded a Brigade on Gallipoli, talking "horse" with other keen judges of the "waler" and the Clydesdale.

as are suited to the requirements of city, suburban, and country butchers, and small goods shops. These lines are all methodically arranged, leading off from an enlarged "cut out" of a prime-quality pig, such as is advocated for use in this business.

### THE CLYDESDALES.

While, as is usually the case in an agricultural and sporting community, the horse section of the Show is exceptionally well catered for, special mention must be made of the magnificent display of Clydesdale draught horses at this year's Show. Seen in their stalls immediately prior to entering the ring for judging, these patient and enormous—one might almost say elephantine—beasts of burden presented a striking picture of power and muscle. And here, let it be said, for the benefit of those who regard the all-conquering motor as having swept the horse off the face of the earth for all utility reasons, that there is still work for the draught horse. It is stated that even in the city, where questions of short haulage are paramount, the gigantic Clydesdale is more economical and of more general use than the internal

combustion engine; and on the farm one ventures to think it will be long before these splendid friends of man are altogether displaced.

Great flanks shining, and manes and tails combed and curled, coloured woollen decorative effects serving as eye-catchers, the placid and gentle Clydesdales blinked sleepily at the observer, obviously quite unperturbed and unconcerned about their imminent fate at the hands of the judges. In some of the boxes prospective champions were accompanied by stable companions, whose rough and shaggy coats contrasted sharply with the well-groomed perfection of their mates. The Clydesdales were a living example in the equine world of how much breeding matters, even in "manual" toil, and no less care is expended on the pedigree of these magnificent specimens of their class than on that of our foremost blood stock racers. Last year's champion, Mr. James Sprott's *The Intent*, was again prominent, and it will be hard to find his equal, fine specimens as his rivals undoubtedly are. The stallions purchased by the State Government for the improvement of farmers' draught stock again came in for a full measure of admiration.

### DAIRY CATTLE—HIGH STANDARD OF QUALITY.

What is rapidly becoming one of the foremost industries of Queensland is naturally exceptionally well catered for—the exhibit of dairy cattle. All the well-known breeds were in evidence, and competent judges agreed that the high standard of quality observed last year had been fully maintained. In fact, it is doubtful if such a fine collection of animals have ever been gathered together in one place in Queensland as were shown at this year's Exhibition. One of the conditions of entry was that each animal should be registered in a recognised herd book, and there is no doubt that the systematic testing of cattle, and the elimination of all those who are not "up to the job" from the herds, is having a great effect upon the milk production standard of the State. One of the features of the Show was the milking tests, which were conducted on the showground, under the supervision of officers of the Department of Agriculture and Stock. The exhibits were drawn from all the well-known dairying districts of the State—the North Coast and Brisbane Valley areas being exceptionally well represented. Altogether the dairy cattle formed one of the main features of the Show, and provided an interesting instance of the progress of dairying in the State.

#### Ayrshires.

Although the Ayrshire cow shows no signs of any falling off in popularity—there were ninety-two exhibits this year under the various classes—they have not yet reached that degree of popularity with breeders in this State which is so much in evidence with the Jerseys and Illawarras. It is almost unnecessary to say that a high standard of excellence was noticeable, as obviously breeders do not trouble to exhibit inferior cattle; but nevertheless a word of appreciation in regard to this breed would not be out of place. It is quite clear that a great deal has been accomplished in the efforts to establish them in Queensland, and they should go ahead rapidly in favour among dairy farmers. Messrs. Anderson Bros., of Southbrook, Jonas Holmes, of Pittsworth, and Thomas Holmes, of Yarranlea, were the biggest exhibitors in this class. On the small side, like the Jerseys, they are just as distinctive in appearance, and some very fine types were numbered among the exhibits, notably Mr. Jonas Holmes's *Tilly* of Longlands, last year's champion Ayrshire cow.

#### Illawarra Shorthorns.

By a very large margin the Illawarra milking Shorthorn maintains its popularity among dairymen. The reason is not far to seek, and for the benefit of the uninitiated it may be explained that while the Jersey and Guernsey give the highest cream content in their milk, and the Friesian, probably the largest actual quantity, the Illawarra has succeeded in combining to the best possible effect both qualities. There were no fewer than 313 specimens of this breed exhibited, and they were fully representative of all the dairying districts of the State. Last year's champion cow, Mr. A. J. Caswell's *Rosie IV.* of Greyleigh, was again before the judges, together with many other representatives of the well known Greyleigh herd. The Oakvale, Blacklands, and Sherwood studs were among other celebrated studs in evidence.

#### Jerseys.

Second only to the Illawarras, the Jersey breed, with 198 exhibits in the various classes, fully sustained its well-deserved popularity. The onyx-eyed, calm little Jersey cows give no idea from a casual glance of the enormous value in cream content of the milk they produce in such rich quantity. Lacking the impressive size



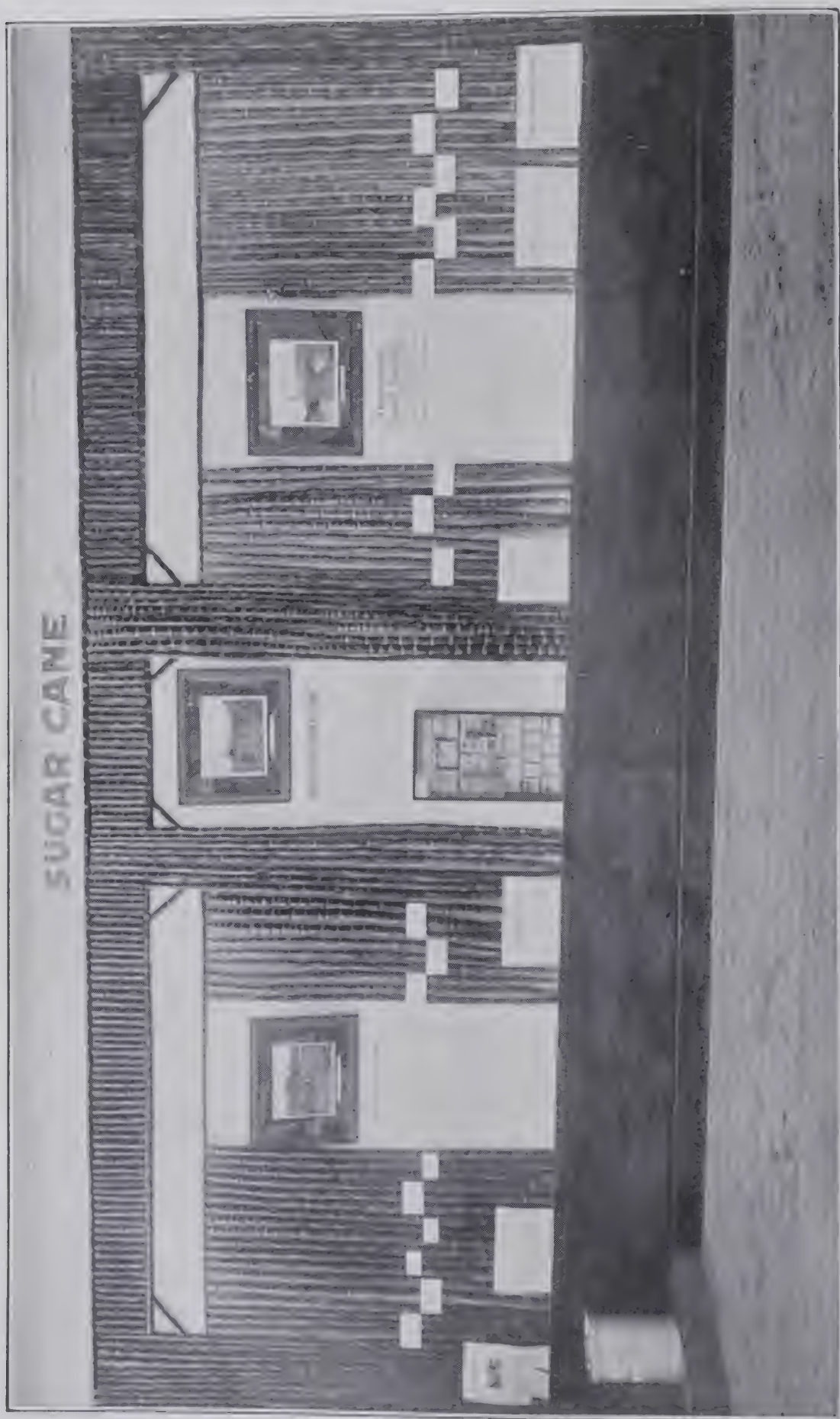


PLATE 74.—A WHITE MAN'S INDUSTRY IN A WHITE MAN'S LAND.

No other agricultural enterprise in Australia employs so many Australian workers. The great results obtained by the Bureau of Sugar Experiment Stations through systematic plant improvement and constant field effort, illustrated. The Sugar Industry is worth nearly £9,000,000 a year to Queensland.



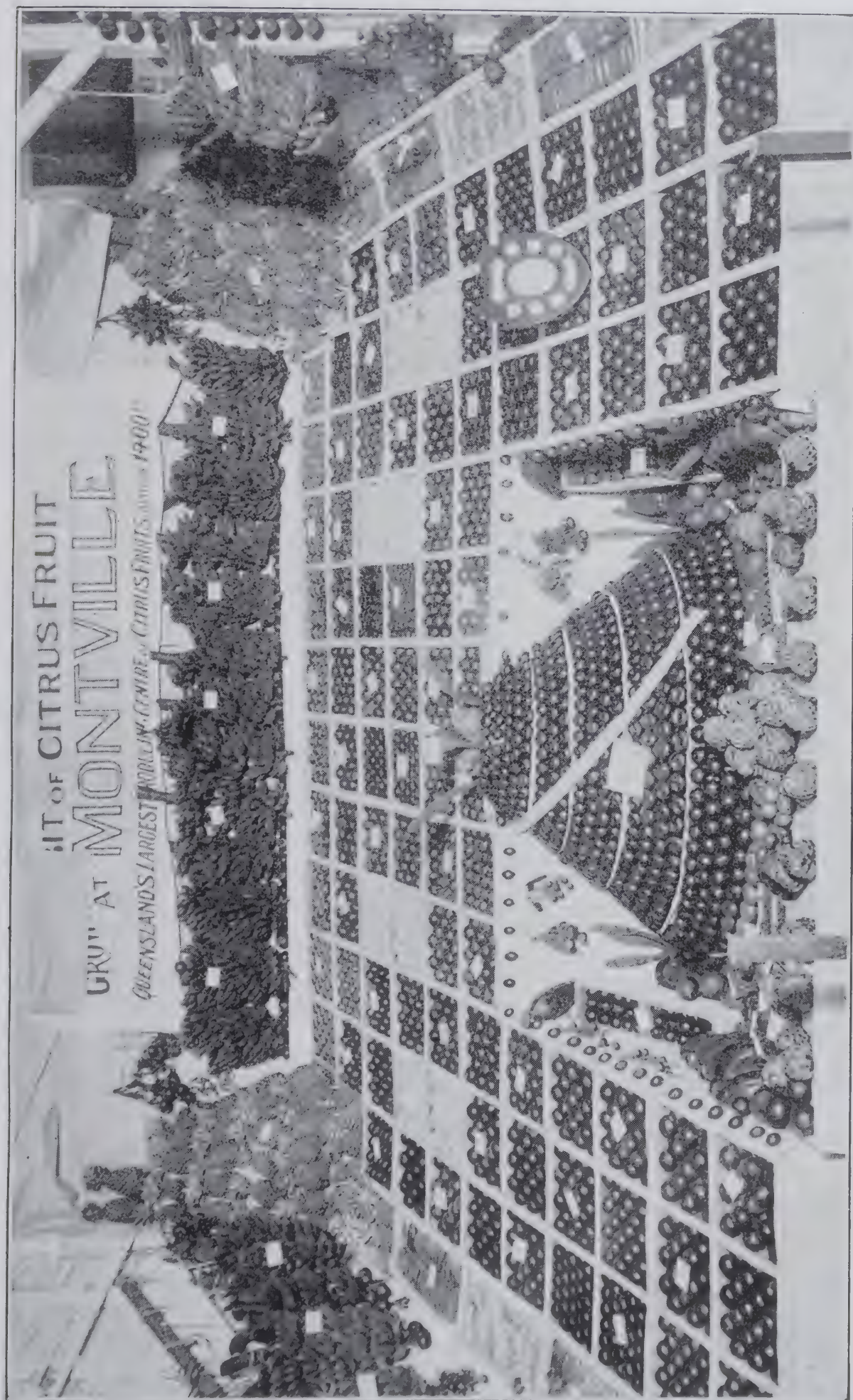


PLATE 75.—FRUITS OF QUEENSLAND FROM THE FERTILE NORTH COAST.



of the Illawarra, their dun-coloured flanks gently heaving as they reflectively chew their cud, there is little outwardly impressive, apart from their beauty, about them. All last year's owners and breeders were represented, and to the casual spectator this class provided one of the most interesting of them all.

### **Guernseys and Friesians.**

These classes of dairy cattle were not particularly well represented as to the number of exhibits, there being only three exhibitors in the former class. This would seem to show that the Jersey, whose main characteristics are practically identical, prevents the spread of popularity of the neighbouring Channel Islander. The class of cattle exhibited, however, was up to last year's standard, and indeed, if anything, was considered by judges to show considerable improvement. The Friesian was more in favour, with a total number of exhibits in all classes of eighty-one cattle. They appeared to be spread well out over the various districts from which they are drawn, and, like the other classes, many fine and valuable specimens were paraded for judgment.

## **DISPLAY OF THE FORESTRY SERVICE.**

### **A Jungle in Miniature.**

The Queensland Government Forest Service is an industrial tree farming and sawmilling corporation charged with the control and management, under the Minister for Lands (Mr. T. Dunstan, M.L.A.) of 5,000,000 acres of landed estates for the production of timber and forest products for the needs of Queensland.

This intimation introduced the Forest Service exhibit at this year's Show. Among the gay array of white toned displays in the pavilion the State Forestry Court loomed rather grimly as a sombre forest interior from whose green glooms projected the brown boles of tall timber, their heights are lost among their interlacing boughs overhead. Among these trees rank upon rank of hoop pines in pure sand, one might walk softly on the forest duff down canopied aisles filled with the lengthening shadows of tree trunks and dappled with such thin sunlight as succeeded in filtering down through the embowering foliage. Here and there in this Araucarian timberland great russet-barked logs of tallowwood lay prone, where the fallers and haulers had left them. Stag horns and elkhorns glinted greenly from the forest roof, and one felt that one, perhaps, even as these fallen trunks, may rest awhile from the clangour of the side shows, in this jungle quietude conjured for us there in the pavilion by the Queensland Forest Service.

### **Sylvan Depths.**

Each year the Forestry exhibit assumes new aspects, but no more dignified presentation of the forests come to town has been yielded to show visitors than this one of 1927. The effect of cloistered sylvan depths was immense. The purpose was to reveal to the passer-by the appearance of a forest plantation of Queensland pine fifteen years after the winged, brown seed has been sown in the nursery beds. Seven by seven feet apart, these trees stood, solid trunks of grown wood, 40 to 50 feet in height, and 15 to 35 inches in girth. Such a forest plantation as this has been actually produced by the Queensland Forest Service at its Wongabel reservation in the Atherton district, and this early experimental effort gives assurance that in the new forests of man's creation now being produced there can be grown ample softwood for Queensland's future.

The Forestry Court tree plantation was life size and life like, and the atmosphere was real. But lest by its reality it should be imagined that there was a young forest slaughtered to make a Brisbane holiday, let it be known that it was just a clever reconstruction from material gathered together from felled scrub land awaiting the clearing fire.

### **Jewel House of the Woods.**

Through the dim forests of stems in this Forestry Court one perceived in the far background, in a glare of light, the russet glint and slanted outline of a bark hut. It was, indeed, a jewel house of the woods, for there were housed the gems of the forestry collection, a dazzling array of brilliant wood wares, of costly trays inlaid with Queensland timbers of rich and varied hues and grain, of cabinets and cases carved from rare products of the Queensland forests, of lustrous walking sticks in ring gidyea, plumwood, red satinay, walnut, bean, and tulip oak; of polished turnery in black ironbox and rose walnut, and what not; creations to delight the craftsman in wood and the connoisseur in timber; treasures, indeed, of the Queensland forests, and tributes to the little army of wood artists now appearing in our midst to deal adequately with them.

By contrast, alongside existed a corner in ruder wood wares, sawn board products of the Queensland Forest Service sawmills and timber yards, which seek to inculcate

in the building public an appreciation of economy and efficiency in wood used in house construction. Witness "A" quality sawn hoop pine for linings, expensive stuff, indeed, and visitors were asked to compare its painted and unpainted surfaces with those of "C" quality alongside and only half its price. They were asked to regard similarly flooring pine of "B" and "C" grades side by side, half of each stained and polished, and consider the effect of the marked difference of cost. Or make the comparison odious, perhaps, for the imported wood, of selected merchantable Queensland pine for concrete work, against Oregon of similar class. Also displayed were the ordinary and the new Brennan butter box as now being turned out in thousands by the Government Forest Service band sawmill at Yarraman, which is cutting 25,000 to 30,000 superficial feet of timber a day.

In solitary state, salmon-pink, silken-rippled, and chaste, a beautiful circular occasional table stood among the cheap-grade building woods. It was a product of red satinay, of which 60,000,000 feet stand awaiting the saw in the State forests of Fraser Island. The Victorian Railways have pioneered this new cabinet wood by ordering large quantities of it for carriage panelling in place of Queensland maple silkwood. It remains now only for Queensland itself to discover it.

### Service Activities.

Around the dim green walls of the Exhibition forest were hung pictures in black and white illustrative of the activities of the Queensland Government Forest Service, this industrial corporation of State timber farming and sawmilling, managers of the 5,000,000 acres of the Crown forest estates. Surveying, road-mending, logging, saw-milling, nursery work, and tree planting were among the operations photographically represented in this art gallery of the trees. Ranged in rows beneath the pictures were polished panels of some of the ornate woods of Queensland.

In a corner were massed living products of the forest nurseries, seedlings of hoop and bunya pine, of silky oak and grey teak, little green babes of the wood destined to go to the saw in thirty to fifty years' time to build the homes of our grand-children. Beside them was a motley collection of wee foreign treeplings of pinus species, the pinus of the Canary Islands, of Florida, and of the Himalayas, and of California, rivals of the Queensland treeplings for a place in the new man-made forests of to-morrow.

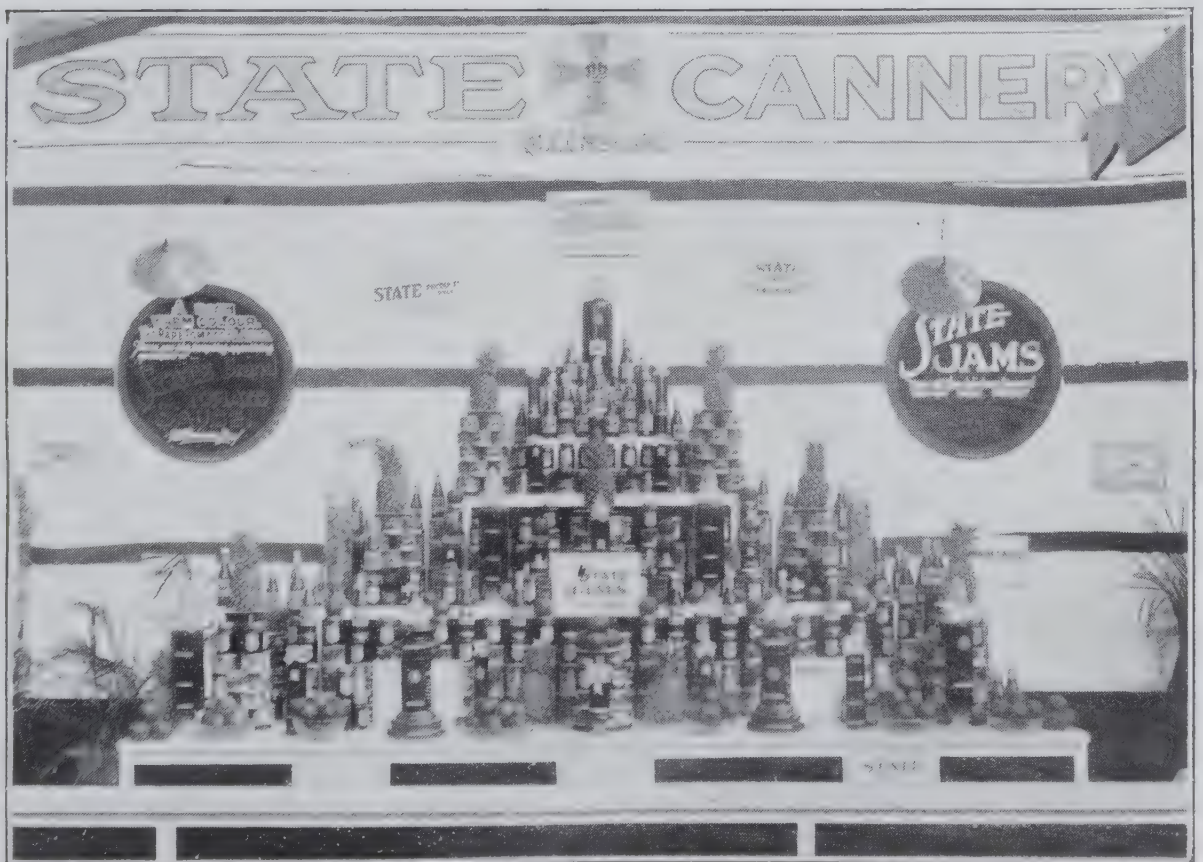


PLATE 76.—THIS FINE EXHIBIT WAS FROM THE STATE CANNERY.





PLATE 77. HOW QUEENSLAND FARMERS ARE SERVED BY NATURE. LEARN THE SCIENCE OF ENTOMOLOGY IN THE ENTOMOLOGICAL BUILDING, DEPT. OF AGRICULTURE, GOVT. DEPT. OF AGRICULTURE, GOVT.



PLATE 78.—DAIRYING BACTERIOLOGY. THE NATIONAL SERVICE OF SCIENCE ILLUSTRATED IN THE DEPARTMENTAL COURT.



## QUEENSLAND AGRICULTURAL COLLEGE.

### WORK OF STUDENT FARMERS.

A practical demonstration of the students of the Queensland Agricultural High School and College was illustrative of the work done in every department of the College at Gatton.

Various fodder crops grown by the pupils occupied the centre stand in the display, and arranged between sheaves seeds raised were displayed. These included wheat, maize, barley, rye, sorghums, cowpea, and various grasses.

Numerous students at the College intend ultimately to concentrate on growing sugar-cane, and for their instruction there is a section on the farm on which numerous varieties of cane are raised. Their efforts as exhibited were worthy of commendation. Wool from merinos, crossbreds, and Corriedales, shorn at the College, was shown in profusion, and the labelling gave complete descriptions of the process of teaching young farm learners all that is essential about sheep rearing.

The Department of Agriculture has a cotton experiment station at the College, and from it was drawn some choice bolls of the Acala variety. Fodder conservation is receiving particular attention, and the demonstration was used to impress upon farmers the need for greater reservation of surplus produce in good years. Ensilage was shown stored in a model silo, a miniature of the one built at the College. Suitable types of fodder for storage also were displayed.

### Cleansing Milk.

Clean milk is required in the interests of public health, and one section of the display was intended to teach dairymen how to separate small, unhealthy particles from the milk. There were on view Wisconsin sediment strainers, one showing the unused cloth and the other the quantity of dust particles cleaned from one pint of milk. These made an interesting comparison.

Various types of cream and milk cans were shown to demonstrate the necessity for using such as will not hold germs in seams. The latest type of English milk pail, rarely seen in Australia, was on the dairying stand contrasted with the popular types in use in Queensland.

Complete tuition in dairying is given at Gatton. There is a model butter factory there, and the student is enabled to proceed from instruction in milk production to the actual work of making butter. Apart from the College, milk supplies are obtained from forty-five outside dairymen, and the butter is marketed on a business basis. Several boxes of butter were on view, and in front of these were a number of cheeses made at the College. These included Edam, Cheddars, brick, and club cheese.

There was a number of interesting chemical appliances on view, including those used for the distillation of petrol and crude oils, the determination of fats in foods, and the determination of volatile fatty acids. To illustrate capillary attraction there were a number of long tubes. These showed the rate at which water rises in various types of soils.

Farm engineering was given a large space in the display. It contained models of engines, pumps, sections of farm plants, gear chains, and safety valves of bearings. The necessity for correct lubrication was eloquently shown by specimens burnt at the ends, whilst alongside are the true parts.

### Tree Dentistry.

Models of silos, swingle bars, hay sheds, and feed rooms, all made by the students, were staged in the carpentry section, and close by there were samples of work done by junior pupils in the tinsmith shop. Work done in the smithy was on view, and these show that a high standard of skill has been reached by the pupils. Similarly leather work was of a high order of merit.

According to the specimens shown, tree dentistry has become a science. The filling of dangerous cavities with cement or other substances is carefully done, and correct methods in pruning and grafting were told with the aid of interesting specimens of the students' work.

Bee keeping, the extraction of honey, and the manufacture of wax, together with appliances necessary in the industry, were shown in an informative way.

In every section the College display was interesting and comprehensive, but it was robbed of much of its attractiveness by the poorness of the accommodation.

Canvas walls do not help the organisers in the difficult task of making the display attractive, and the importance of the work warrants a better domicile. Those who supervised the staging of the exhibit were Messrs. F. O. Bosworth (English master), J. W. Howie (Horticultural Instructor), and R. Keats (Dairy Instructor).

### DAIRY BACTERIOLOGY.

The dairy bacteriology display in the court of the Department of Agriculture and Stock was arranged principally for the purpose of demonstrating the necessity of efficient cleansing of the various utensils used in the dairying industry, as many imperfections in dairy products—milk, cream, butter, and cheese—are associated with, and in most cases due entirely to, bacterial agency.

As a result of carefully conducted experiments, it was shown that large numbers of germs survive in milk and cream cans which have been apparently well washed and rinsed with boiling water. Milk and cream cans are only efficiently cleansed when subjected to live steam for three minutes.

Plate and tube cultures taken from rinsings from improperly cleansed milk and cream cans showed gross contamination with various micro-organisms. These were contrasted with similar plates and tubes prepared from rinsings from efficiently cleansed and sterilised cans.

One important section of the exhibit demonstrated that milk in the cow's udder is germ free, and only becomes contaminated after it is drawn. By adopting precautionary measures it is possible to obtain from the cow germ-free milk which will keep indefinitely at any temperature. To illustrate this, samples of milk had been drawn with precautionary measures direct from the cow into sterilised receptacles in May and July last, and were still perfectly sweet, while samples drawn on 7th August without precautionary measures directly into unsterilised receptacles had turned sour.

### Micro-Organisms.

Cultures of micro-organisms isolated from contaminated milk and cream are capable of producing: (1) Ropiness in milk and cream; (2) a tallowy taste in butter; (3) sponginess and gas formation in cheese. Organisms which are found in contaminated water, and are likely to produce faults in dairy produce, were exhibited. There were also shown various moulds and colour and unpleasant odour producing bacteria which have been found associated with dairy products.

Pure lactic starters for the ripening of cream in the manufacture of butter, the more general use of which must result in the production of improved flavour and aroma, had a place in the exhibit.

The practical benefits of pasteurisation applied to cream and milk demonstrated that practically all bacteria which otherwise may produce unpleasant flavour, aroma, &c., are destroyed. Details of a simple method of home pasteurisation also were clearly set out.

The causative organism of contagious mammitis (streptococcal) was shown growing in artificial media, and the methods of controlling the disease by hygiene and vaccine treatment were described.

### YOUNG JUDGES—TESTS AT THE SHOW.

Organised by Mr. P. Frankel (Royal National Association Vice-President), the young judges' competitions now form an important and popular section of the Royal National Show. They are not only creating more interest and keener competition each year among the young farmers and intending farmers of the State, but the standard of the work of the competitors is much higher.

The classes this year provided for the judging of Clydesdale stallions, Shorthorn bulls, Hereford bulls, Ayrshires, Jerseys, Illawarra Milking Shorthorns, Friesians, Guernseys, Berkshire boars, and Tamworth boars. All classes were open to persons not over twenty-five years of age, including students attending Agricultural Colleges, young farmers, and farmers' sons. Winners of judging competitions at any previous Royal National Show were not eligible to compete in similar classes at this or future Shows.

The entries in each section were exceptionally good, particularly in the Illawarra Milking Shorthorn class, for which there were no fewer than eighteen competitors as





PLATE 79.—BETTER COWS ON THE FARM IS THE OBJECT OF THE DEPARTMENTAL HERD TESTING SCHEME. Concrete results are evident in this display of High-class Dairy Products, a distinctive feature of the Court.



PLATE 80.—THE COW AND THE PLOUGH.

Their importance to the nation was demonstrated in this striking exhibit in the Departmental Court. The Dairying Industry is now worth six and a-half millions sterling to Queensland annually.



compared with eleven last year. The entrants in each class included several students from the Queensland Agricultural College, Gatton, where the value of actual judging and handling of the animal by each student is fully recognised.

Seven young men took part in the judging of Shorthorn bulls. With two exceptions the competitors were students from the Queensland Agricultural College. The judge, Mr. G. B. Waller, of Wallarobba, New South Wales, had selected three young bulls, and the competitors, who were required to place the beasts in their order of merit and also state their reasons for so doing, were allowed fifteen minutes in which to carry out their task.

### Keen Competition.

The competition was remarkably keen throughout, and a subsequent examination of the papers showed that they were exceptionally good, the difference between the first four papers being very small. C. Tilley, of Gatton College, was the winner, with R. P. Hughes, Hendon, and Reg. A. Price, Gatton College, equal for second place.

In announcing the results, Mr. Waller congratulated the lads on their good work, remarking that the papers showed that they evidently had a proper grasp of their subject. Some of the competitors, however, had made the mistake of giving rather too much prominence to details that were not essential. They must always remember to take into consideration the main features of the animal—viz., the character, lines, and flesh. He also recommended the young judges to depend on their fingers, and not their eyes, in judging cattle. Their eyes might deceive them in the finer points of an animal, but their fingers never would.

Mr. Waller explained in detail his reasons for placing the animals in their respective places, and highly complimented T. Graham, of Gatton College, on his fine description of each beast.

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## HORTICULTURE.

The Horticultural Pavilion at this year's Royal Show was again a beauty spot, where a wonderful wealth of blooms greeted the eye. A special feature was an excellent exhibition of sweet peas, a long stand, running the whole length of the pavilion, being occupied by these beautiful, vari-coloured winter blooms. The entry in the sweet pea class was very satisfactory, and the judge (Mr. F. Phillips) had a difficult task set him. He said that the peas were of a very high standard this year, which was incidental to Queensland, this State possessing the ideal climate for the growth of winter-flowering sweet peas. Many new varieties were shown, and they compared very favourably with some of the older varieties, all combining to make a fine centrepiece in an admirable collection of choice products of the home garden.

The colours of many of the sweet peas this year were uncommon, showing that growers of this choice winter flower are ever on the alert for new varieties. The rose exhibits were also excellent, and an improvement on last year's display, and better than was anticipated, considering the unfavourable weather. As a matter of fact, the quality of the roses all round was superior to any shown at the Brisbane Exhibition for the past three years. The several classes were also well filled, considering that the entries had to be in so early. The outstanding roses were a Frau Karl Drusehki, exhibited by Mrs. Proctor; a George Dickson, a Rhea Reid, and a Mrs. Herbert Stephens (the latter three being exhibited by Mrs. J. Willis). The other classes of cut flowers made a fine showing and the novice classes were well filled. A very fine non-competitive display of pot plants, ferns, and flowers, &c., was staged by Mr. M. G. Rose, of Northgate Nurseries, the exhibit being well arranged, and of a most comprehensive character. In the class for pot plants there was unfortunately little competition, one exhibitor (Mr. Henry Jarrett) taking the bulk of the first prizes.

The Horticultural Society's competition, open to suburban and country competitors, which should draw a good entry, was unfortunately not a success in this connection, Toowong's being the only entry received, and it was an admirable exhibit, nicely arranged, and reflected great credit on the growers who participated in the collective exhibit. The Horticultural Society's competition is certainly worthy of better patronage, and it is hoped that next year a more satisfactory entry will be forthcoming, as this class provides plenty of scope for the individual exhibitor to make a name for his particular locality by contributing to a collective exhibit. The display in the Horticultural Pavilion at the Brisbane National Show is improving every year, and the question of providing more accommodation for the horticultural classes will soon arise.

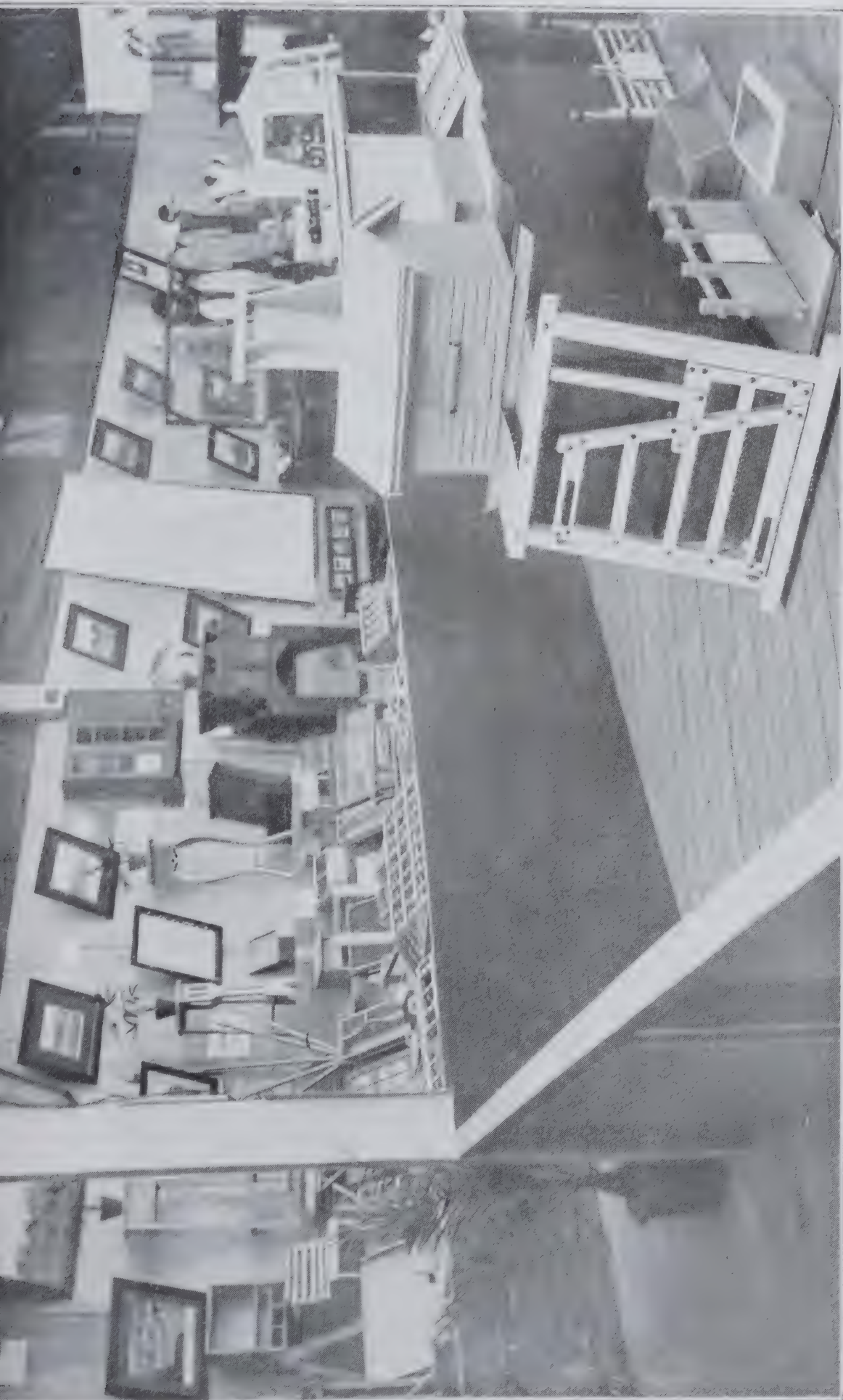


PLATE 81.—THE QUEENSLAND BOY AND HIS INDUSTRY.

The work of the Rural Schools in its wide range and practical efficiency formed one of the most attractive exhibits at this year's Show.



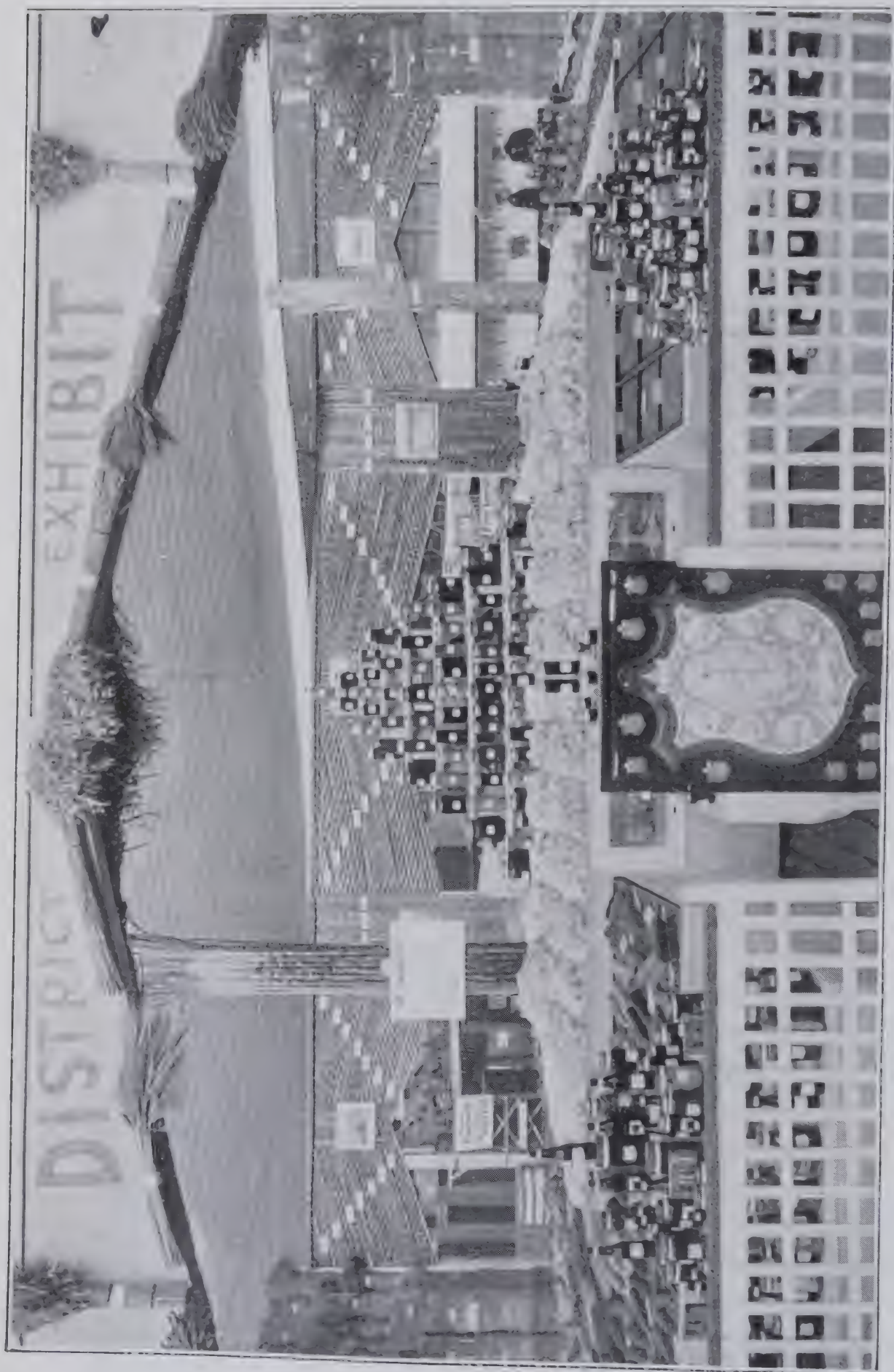


PLATE 82 --THE WINNING DISPLAY IN "A" GRADE DISTRICT COMPETITIONS.  
OF NEW SOUTH WALES.

THE EXHIBIT FROM THE NORTH COAST DISTRICT

# THE AWARDS.

## DISTRICT EXHIBITS.

### A GRADE.

The winning honours in the coveted Chelmsford Shield in the competition for District Exhibits of primary products and manufactures at this year's Exhibition were awarded to the magnificent display from the North Coast and Tableland of New South Wales. Its grand aggregate of points was 1,223 out of a possible aggregate of 1,572. The Wide Bay and Burnett District was second in the aggregate with 1,181 points. Details:—

	Possible Points.	Wide Bay and Burnett District	North Coast and Tablelands of N.S.W.	South Coast of Queensland.
<b>DAIRY PRODUCE—</b>				
Butter, 1 box, 56 lb. .. ..	90	84½	85½	85½
Milk (condensed, concentrated, or dried), and by-products .. ..	40	10	38	5
Cheese, not less than 1 cwt. .. ..	60	48	50	45
Eggs, 1 dozen .. ..	20	14	10	16
Totals .. ..	210	156½	183½	151½
<b>FOODS</b>				
Hams and bacon .. ..	50	46	40	47
Rolled and smoked beef and mutton ..	20	15	..	18
Smallgoods and sausages, if smoked or pre- served .. ..	10	8	6	9
Fish—Smoked, preserved, or canned ..	10	7	6	6
Canned meats .. ..	25	10	15	20
Lard, tallow, and animal oils .. ..	20	18	12	14
All butcher's by-products .. ..	10	8	7	8
Honey, and by-products thereof .. ..	20	17	18	13
Confectionery, factory made .. ..	10	3	4	5
Bread, scones, biscuits, and cakes—factory made .. ..	10	5	5	7
Totals .. ..	185	137	113	147
<b>FRUITS, VEGETABLES, AND ROOTS—FRESH AND PRESERVED —</b>				
Fresh fruit—all kinds .. ..	60	57	46	52
Preserved fruits, jams and jellies .. ..	30	22	28	22
Crystallised and dried fruits .. ..	20	10	18	..
Fresh vegetables, all kinds, including table pumpkins, but excluding potatoes ..	25	18	20	17
Preserved and dried vegetables, pickles, sauces .. ..	10	8	10	8
Potatoes, English and sweet .. ..	40	30	35	26
Roots ( <i>see</i> reg. 4), all kinds and their pro- ducts, including meals (1 lb. each) arrow- root, cassava, &c. .. ..	14	12	7	10
Cocoanuts, peanuts, and other nuts ..	10	6	8	3
Totals .. ..	209	163	172	138



DISTRICT EXHIBITS (A GRADE)—*continued*.

	Possible points.	Wide Bay and Burnett District	North Coast and Tablelands of N.S.W.	South Coast of Queensland.
<b>GRAIN, ETC.—</b>				
Wheat .. .. .	50	30	47	28
Flour, bran, pollard, macaroni, and meals prepared therefrom .. .. .	10	9	6	8
Maize, 3 cobs, and $\frac{1}{4}$ bushel of each variety .. .. .	50	38	45	32
Maizena, meals, starch, glucose, and corn-flour .. .. .	10	6	5	5
Oats, rye, barley, malt, pearl barley, and their meals .. .. .	30	20	27	20
Totals .. .. .	150	103	130	93
<b>MANUFACTURES AND TRADES.—</b>				
All woodwork .. .. .	30	27	18	15
All metal and ironwork .. .. .	30	25	20	28
Leather and all leather work and tanning .. .. .	20	16	20	19
Manufactured woollen and cotton fibre .. .. .	30	15	25	20
All tinwork .. .. .	10	7	8	10
Artificial manures .. .. .	10	6	2	9
Brooms and brushes .. .. .	10	3	6	8
Manufactures not otherwise enumerated .. .. .	15	14	13	15
Totals .. .. .	155	113	112	124
<b>MINERALS AND BUILDING MATERIALS.—</b>				
Gold, silver, copper, and precious stones .. .. .	25	20	11	7
Coal, iron, other minerals, and salt .. .. .	30	22	9	9
Stone, bricks, cement, marble, terra-cotta .. .. .	20	10	10	15
Woods—Dressed, undressed, and polished .. .. .	25	22	23	22
Totals .. .. .	100	74	53	53
<b>TROPICAL PRODUCTS.—</b>				
Sugar-cane .. .. .	60	53	55	40
Sugar, raw and refined .. .. .	20	12	12	8
Rum, other spirits and by-products .. .. .	10	10	8	9
Coffee (raw and manufactured), tea, and spices .. .. .	10	6	5	3
Cotton (raw) and by-products .. .. .	30	20	20	25
Rubber .. .. .	10	10	..	..
Oils (vegetable) .. .. .	10	10	10	..
Totals .. .. .	150	121	110	85
<b>WINES, ETC.—</b>				
Wines .. .. .	15	8	9	5
Aerated and mineral spa water, vinegar, and cordials .. .. .	10	6 $\frac{1}{2}$	7	6
Ales and stout .. .. .	10	7	..	..
Totals .. .. .	35	21 $\frac{1}{2}$	16	11
<b>TOBACCO—</b>				
Tobacco (cigar and pipe), in leaf ... .. .	20	10	15	15

DISTRICT EXHIBITS (A GRADE)—continued.

	Possible Points.	Wide Bay and Burnett District	North Coast and Tablelands of N.S.W.	South Coast of Queensland
HAY, CHAFF, ETC.—				
Hay—Oaten, wheaten, lucerne, and other varieties .. .. .	30	17	29	15
Grasses and their seeds .. .. .	10	6	9	5
Chaff—Oaten, wheaten, lucerne, and other varieties .. .. .	50	36	42	36
Ensilage and other prepared cattle fodder ..	20	15	8	8
Sorghums and millets, in stalk .. ..	10	8	7	5
Commercial fibres (raw and manufactured)	10	6	9	8
Pumpkins and other green fodder .. ..	10	6	8	7
Broom millet, ready for manufacture ..	10	8	6	4
Farm seeds, including canary seed .. ..	13	10	11	8
Totals .. .. .	163	112	129	96
WOOL, ETC.—				
Scoured wool .. .. .	40	37	40	37
Greasy wool .. .. .	60	50	60	47
Mohair .. .. .	10	8	7	7
	110	95	107	91
ENLARGED PHOTOGRAPHS .. .. .	5	3	5	2
EFFECTIVE ARRANGEMENT—				
Comprehensiveness of view .. ..	20	19	19	16
Arrangement of sectional stands .. ..	25	22	24	19
Effective ticketing .. .. .	10	9	10	8
General finish .. .. .	25	22	24½	19
Totals .. .. .	80	72	77½	62
Grand Totals .. .. .	1,572	1,181	1,223	1068½

B GRADE.

In the very fine competition for Primary Products Only, the Brisbane Valley, which won the same competition in 1926, followed up that success with another first on this occasion. The runners-up were the Northern Darling Downs, who were in a similar position in 1926. Kingaroy exhibit was a meritorious third with an aggregate of 912 points. In the detailed points it is interesting to note that while Brisbane Valley and Northern Darling Downs went back in points on their 1926 figures, Kingaroy improved theirs. This will be better noted by a comparison of the figures of the two years of those three exhibits. They were, with 1926 in parenthesis, as follows:—Brisbane Valley 1,030½ (1,089½); Northern Darling Downs, 926 (964); Kingaroy, 912 (891). In the sectional points, some of the contests were very close. For instance, in Dairy Produce, there was only 13½ points difference between the first and the last of the five exhibits. Again, in the Food Section, the points awarded varied from 72 to 96. In some of the other sections there were similar keen contests. The detailed points are as follows:—

	Possible points.	Narrango District.	Oakey District.	Northern D.D. District.	Brisbane Valley District.	Kingaroy District.
DAIRY PRODUCE—						
Butter, one box, 56 lb. .. ..	90	83	84	84½	84	84
Cheese, not less than 1 cwt. .. ..	60	52	55	60	53	50
Eggs (suitable for domestic use) ..	20	12	12	16	18	17
Totals .. .. .	170	147	151	160½	155	151



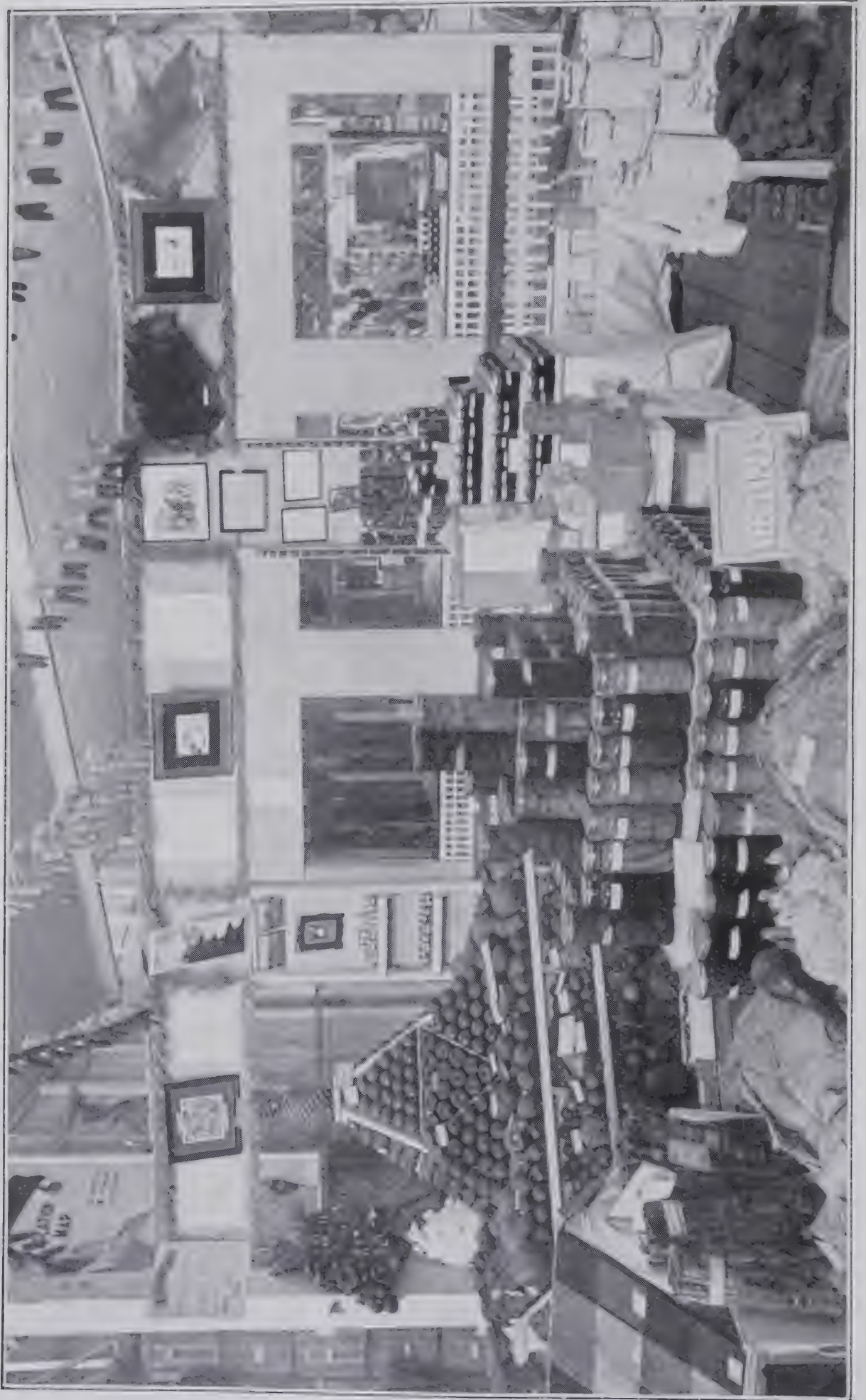


PLATE 83.—THE WINNING DISPLAY IN "B" GRADE DISTRICT COMPETITION EXHIBIT FROM THE BUSBY VALLEY.

DISTRICT EXHIBITS (B GRADE)—*continued.*

	Possible Points.	Nanango District.	Oakey District.	Northern D.D. District.	Frisbane Valley District.	Kingaroy District.
<b>FOODS—</b>						
Hams, bacon, rolled and smoked beef and mutton .. .. .	50	35	36	41	40	42
Fish, smoked .. .. .	10	..	5	4	5	4
Lard, tallow, and animal oils .. .. .	20	15	15	15	18	17
Honey and by-products thereof .. .. .	20	15	8	14	18	14
Confectionery (home made) .. .. .	10	3	3	2	6	2
Biscuits, bread, cakes, and scones (home made) .. .. .	10	6	5	8	9	7
Totals .. .. .	120	74	72	84	96	86
<b>FRUITS, VEGETABLES, AND ROOTS (Fresh and Preserved)—</b>						
Fresh fruits, all kinds .. .. .	60	30	30	52	57	50
Preserved fruits, jams, and jellies (home made) .. .. .	30	20	20	23	26	20
Crystallised and dried fruits (home made or dried) .. .. .	20	8	..	16	12	10
Fresh vegetables, all kinds, including table pumpkins, but excluding potatoes .. .. .	25	16	14	18	20	16
Preserved and dried vegetables, pickles, sauces, home made or dried .. .. .	10	5	6	8	9	7
Potatoes, English and sweet .. .. .	40	30	22	24	33	32
Roots, all kinds, and their products, including meals, arrowroot, cassava, &c. .. .. .	14	6	..	5	8	11
Cocanuts, peanuts, and other nuts .. .. .	10	4	3	3	7	8
Vegetable seeds .. .. .	10	6	6	4	6	8
Totals .. .. .	219	125	101	153	178	162
<b>GRAIN, ETC.—</b>						
Wheat .. .. .	50	38	32	40	36	33
Flour, bran, pollard, macaroni, and meals prepared therefrom .. .. .	10	7	9	7	2	6
Maize .. .. .	50	44	28	32	45	46
Maizena, meals, starch, glucose, and cornflour .. .. .	10	3	2	5	3	5
Oats, rye, barley, rice, malt, pearl barley, and their meals .. .. .	30	18	12	23	22	20
Totals .. .. .	150	110	83	107	108	110
<b>WOODS—</b>						
Woods, dressed, undressed, and polished .. .. .	25	21	20	20	22	23
Wattle bark .. .. .	15	12	10	10	14	12
Totals .. .. .	40	33	30	30	36	35
<b>HIDES, AND HOME-PRESERVED SKINS (for Domestic use) .. .. .</b>						
	15	15	5	12	15	10
<b>TROPICAL PRODUCTS—</b>						
Sugar-cane .. .. .	60	10	..	9	20	15
Coffee, tea, and spices .. .. .	10	8	..	5	8	7
Cotton (raw) and by-products .. .. .	30	20	12	20	20	15
Totals .. .. .	100	38	12	34	48	37



DISTRICT EXHIBITS (B GRADE)—*continued.*

	Possible points.	Nanango District.	Oakey District.	Northern D.D. District.	Brisbane Valley District.	Kingaroy District.
<b>MINERALS—</b>						
Gold, silver, copper, and precious stones .. .. .	25	11	2	6	13	12
Coal, iron, and other minerals and salt .. .. .	30	13	10	12	14	12
Totals .. .. .	55	24	12	18	27	24
<b>TOBACCO—</b>						
Tobacco, cigar and pipe, in leaf .. .. .	20	12	8	12	12	10
<b>HAY, CHAFF, ETC.—</b>						
Hay—Oaten, wheaten, lucerne, and other varieties .. .. .	30	21	20	22	27	20
Grasses and their seeds .. .. .	10	8	7	9	8	7
Chaff—Oaten, wheaten, lucerne, and other varieties .. .. .	50	40	22	35	44	30
Ensilage and other prepared cattle fodder .. .. .	20	14	..	8	16	10
Sorghums and millets, in stalk .. .. .	10	9	6	8	9	8
Commercial fibres, hemp, and flax .. .. .	15	4	..	8	12	10
Pumpkins and other green fodder .. .. .	10	9	9	7	8	7
Broom millet, ready for manufacture .. .. .	10	9	6	9	9	9
Farm seeds, including canary seed .. .. .	13	6	6	8	8	8
Totals .. .. .	168	120	76	114	141	109
<b>WOOL, ETC.—</b>						
Scoured wool .. .. .	40	37	37	35	36	36
Greasy wool .. .. .	60	49	50	59	50	48
Mohair .. .. .	10	9	..	9	7	7
Totals .. .. .	110	95	87	103	93	91
ENLARGED PHOTOGRAPHS .. .. .	5	3	2	3	5	2
<b>LADIES' AND SCHOOLS' WORK, AND FINE ARTS—</b>						
Needlework and knitting .. .. .	25	15	10	16	22	12
School needlework by pupils of schools in the district .. .. .	5	3½	2	3½	4½	2
Fine arts .. .. .	5	3	2	5	5	5
School work, maps, writing, &c., by pupils in the district .. .. .	10	8	4	9	8	8
Totals .. .. .	45	29½	18	33½	39½	27
<b>GENERAL POINTS—</b>						
Effective arrangement, comprehensive-ness of view .. .. .	20	18	15	18	19	16
Arrangement of sectional stands .. .. .	25	21	15	17	24	16
Effective ticketing .. .. .	10	8	6	8	10	8
General finish .. .. .	25	22	16	19	24	18
Totals .. .. .	80	69	52	62	77	58
Grand Totals .. .. .	1,927	894½	709	926	1,030½	912

ONE-MAN FARM.  
EIGHT FINE DISPLAYS.

The one-man farm exhibit contest at this year's Exhibition was productive of eight magnificent displays; a record for this section. Pride of place was awarded to Mr. H. Franke, who secured 473 points, with Mr. J. Beck a very good second, with 445½ points. The competition was very keen. Details of the awards are:—

	Possible Points.	H. Franke.	E. J. Rosow.	W. D. Ponton.	L. D. Christensen.	J. T. Whiteway.	J. Longes.	W. Brumpton.	J. Beck.
DAIRY PRODUCE—									
Butter, 6 lb. . . . .	25	17½	17	16½	18½	17½	18	17	19
Cheese, 1 large (10 lb.), or 2 small (5 lb.) each, home made . . . . .	20	16	5	12	14	16	3	10	..
Eggs of domestic fowl ..	5	4	2	4	2	4	2	2	5
Totals . . . . .	50	37½	24	32½	34½	37½	23	29	24
FOODS—									
Hams (15 lb.), bacon (15 lb.), home-cured . . . .	20	16	18	15	17	18	17	15	15
Corned, smoked, and spiced beef and mutton, 10 lb. . . . .	10	8	6	8	8	7	7	7	8
Honey, any variety, and by-products thereof . .	15	7	3	14	3	6	2	3	6
Beeswax, 6 lb. . . . .	5	3	2	4	2	2	1	2	2
Bread (2 loaves), and scones (1 dozen) . . . .	5	2	2	2	2	3	3	3	3
Confectionery and sweets, 3 lb. . . . .	5	3	1	2	1	3	2	1	1
Home cookery, including cakes, biscuits, and other foods . . . . .	7	4	3	1	2	4	1	4	2
Lard, tallow, and animal oils . . . . .	5	4	4	4	5	5	3	3	4
Totals . . . . .	72	47	39	50	40	48	36	38	41
FRUITS, VEGETABLES, AND ROOTS (fresh and pre- served)—									
Fresh fruits, all kinds . .	25	20	18	21	15	22	10	10	17
Crystallised and dried fruits . . . . .	10	8	9	9	5	8	6	5	..
Preserved fruits, jams, and jellies . . . . .	15	12	13	13	10	13	9	10	12
Fresh vegetables . . . .	15	13	8	7	8	11	6	5	9
Pickles and sauces . . . .	15	13	12	13	8	13	7	8	10
Potatoes and roots . . . .	25	22	17	16	16	10	11	10	23
Table pumpkins, squashes, and marrows, 56 lb. . . .	10	7	8	7	7	7	6	6	8
Cocoanuts and nuts . . . .	7	3	3	3	5	6	3	5	3
Vegetable and garden seeds	5	4	4	5	4	4	4	3	..
Arrowroot, 10 lb. . . . .	5	4	5	4	5	5	..	3	4
Sugar beet, 3 lb. . . . .	5	5	..	..	5	..	5	5	..
Cassava, 3 lb. . . . .	5	..	5	5	5	5	..	..	5
Ginger, 3 lb. . . . .	5	..	..	3	..	5	2	..	..
Totals . . . . .	147	111	102	106	93	109	69	70	91





PLATE 84.—MR. H. FRANKE'S FINE WINNING EXHIBIT IN THE "ONE-MAN FARM" COMPETITION.

ONE-MAN FARM—*continued.*

	Possible Points.	H. Frank.	E. J. Rossow.	W. D. Ponton.	L. D. Christensen.	J. T. Whiteway.	J. Donges.	W. Brumpton.	J. Beck.
<b>GRAIN, ETC.—</b>									
Wheat .. .. .	25	24	12	15	22	3	6	24	13
Maize .. .. .	25	25	18	20	20	16	12	8	24
Barley, oats, rye, and rice	20	17	6	17	12	7	4	12	18
Home-made meals from above varieties of grain	10	8	10	8	8	9	7	10	9
Totals .. .. .	80	74	46	60	62	38	29	54	64
<b>TROPICAL PRODUCTS—</b>									
Sugar-cane, 24 stalks or 1 stool .. .. .	30	3	6	2	15	16	..	2	20
Cotton, in seed .. .. .	20	10	15	12	12	15	15	12	15
Coffee .. .. .	5	..	..	..	3	5	..	..	3
Totals .. .. .	55	13	21	14	30	36	15	14	38
<b>TOBACCO—</b>									
Tobacco, leaf, dried ..	10	8	5	9	8	5	..	4	6
<b>HAY, CHAFF, ETC.—</b>									
Hay—Oaten, wheaten, lucerne, and other varieties	20	13	9	9	15	6	11	8	17
Grasses and their seeds, including canary ..	10	4	5	7	7	6	6	1	7
Chaff—Oaten, wheaten, lucerne, and other varieties .. .. .	20	20	13	4	15	7	14	10	18
Ensilage, any form .. .. .	15	7	6	3	6	6	4	2	15
Cattle fodder (pumpkins and green fodder) ..	15	14	8	10	9	6	10	7	10
Sorghum and millet (in stalk) .. .. .	10	9	10	6	6	4	5	4	7
Broom millet, 10 lb. ..	10	6	7	8	8	6	2	8	10
Cowpea, seed, 7 lb. .. ..	7	6	6	3	7	3	3	3	5
Flax, 3 lb., and hemp, 3 lb.	5	4	2	4	4	4	..	3	4
Totals .. .. .	112	83	66	54	77	48	55	46	93
<b>WOOL—</b>									
Greasy, 3 fleeces .. .. .	20	16	15	18	18	17	15	20	17
Mohair .. .. .	5	4	5	3	..	4	3	4	4
Totals .. .. .	25	20	20	21	18	21	18	24	21
<b>DRINKS, ETC.—</b>									
Temperance drinks, 6 bots.	10	7	6½	5	7	7	4½	6½	7
<b>WOMEN'S AND CHILDREN'S WORK—</b>									
Needlework and knitting	10	5	4	6	7	9	3	9	5
Fine arts .. .. .	5	2	..	3	1	4	2	1	1
Fancy work .. .. .	15	6	7	3	8	10	4	11	8
School work, maps, writing, &c. .. .. .	5	4	4	3	..	2	4	2	2
School needlework .. .. .	5	1	2	1	..	4	3	..	4
Totals .. .. .	40	18	17	16	16	29	16	23	20



ONE-MAN FARM—*continued.*

	Possible Points.	H. Franke.	E. J. Rossow.	W. D. Ponton.	L. D. Christensen.	J. T. Whiteway.	J. Donges.	W. Brumpton.	J. Beck.
MISCELLANEOUS— Articles of commercial value .. .. .	5	5	5	5	4	5	3	4	5
PLANTS AND FLOWERS IN POTS	5	5	2	4	..	5	4	3	..
TIME AND LABOUR- SAVING USEFUL ARTICLES— Made on the farm ..	10	7	6	..	9	9	8	9	..
EFFECTIVE ARRANGEMENT OF EXHIBITS— Comprehensiveness of view .. .. .	10	9	6½	8	9	6½	8½	7½	9
Arrangement of stands ..	10	10	7	9½	8	7½	6½	7	9
Effective ticketing ..	5	4	3	4½	3½	4	3	2½	4½
General finish .. ..	15	14½	11	14½	13½	11½	9	10½	13
Totals .. .. .	40	37½	27½	36½	34	29½	27	27½	35½
Grand Totals ..	661	473	387	413	432½	424	307½	352	445½

## TROPICAL PRODUCTS.

## NORTH QUEENSLAND'S FINE EXHIBIT.

Although there was only one exhibit in the Tropical Products District competition, that of North Queensland, this was awarded a very high percentage of points, and is one of the interesting features of the District Exhibit Section. Details:—

	Possible Points.	Northern Queensland.
DAIRY PRODUCE—		
Butter, 1 box, 56 lb. .. .. .	90	82
Milk (in any form), cream .. .. .	10	..
Cheese, 1 cwt. .. .. .	60	50
Eggs (suitable for domestic use) .. .. .	20	14
Totals .. .. .	180	146
FOODS—		
Hams, bacon, rolled and smoked beef and mutton ..	50	42
Smallgoods and sausages .. .. .	5	3
Canned meats .. .. .	25	22
Fish—smoked, preserved, or canned .. .. .	10	8
Lard, tallow, and animal oils .. .. .	20	15
All butchers' by-products .. .. .	10	5
Honey and by-products thereof .. .. .	20	12
Confectionery .. .. .	10	3
Biscuits, bread, cakes, and scones .. .. .	10	6
Totals .. .. .	160	116

TROPICAL PRODUCTS—*continued.*

	Possible Points.	Northern Queensland.
<b>FRUIT, VEGETABLES, AND ROOTS—</b>		
Fresh and preserved, fresh fruits, all kinds .. ..	60	52
Preserved fruits, jams, jellies .. ..	20	16
Crystallised and dried fruits .. ..	20	14
Fresh vegetables, all kinds, including table pumpkins, but excluding potatoes .. ..	25	15
Preserved and dried vegetables, pickles, and sauces ..	10	8
Potatoes, English and sweet .. ..	40	34
Roots, all kinds, and their products, including meals, arrowroot, cassava, &c. .. ..	14	9
Cocoanuts, peanuts, and other nuts .. ..	10	7
Vegetable seeds .. ..	10	..
Totals .. ..	209	155
<b>GRAIN—</b>		
Maize, in cob .. ..	25	15
Maize, shelled .. ..	25	16
Rice and other cereals and their meals .. ..	15	10
Totals .. ..	65	41
<b>MINERALS AND BUILDING MATERIALS—</b>		
Gold, silver, copper, and precious stones .. ..	25	14
Coal, iron, and other minerals, and salt .. ..	30	14
Stone, bricks, cement, marble, terra-cotta .. ..	20	12
Woods, dressed, undressed, and polished .. ..	25	24
Totals .. ..	100	64
<b>TROPICAL PRODUCTS—</b>		
Sugar-cane .. ..	60	56
Sugar, raw and refined) .. ..	20	14
Rum, other spirits and by-products .. ..	10	5
Coffee (raw and manufactured), tea, spices, and essences ..	10	8
Cotton (raw) and by-products .. ..	30	15
Rubber .. ..	10	8
Oils (medical and machinery) .. ..	15	..
Tropical products, not elsewhere enumerated .. ..	15	..
Totals .. ..	170	106
<b>WINES, ETC.—</b>		
Wines .. ..	15	4
Vinegar, cordials, aerated, and mineral spa waters ..	10	7
Ales and stout .. ..	10	8
Totals .. ..	35	19
<b>TOBACCO, ETC.—</b>		
Tobacco (raw) .. ..	20	15
Cigars, cigarettes, and snuff .. ..	10	..
Totals .. ..	30	15



TROPICAL PRODUCTS—*continued.*

	Possible Points.	Northern Queensland.
<b>HAY, CHAFF, ETC.—</b>		
Hay—Oaten, wheaten, lucerne, other varieties .. ..	30	18
Grasses and their seeds .. ..	10	6
Chaff—Oaten, wheaten, lucerne, and other varieties ..	50	20
Ensilage and other prepared cattle fodder .. ..	20	10
Sorghums and millets, in stalk .. ..	10	7
Commercial fibres, hemp, and flax .. ..	15	2
Pumpkins and other green fodder .. ..	10	6
Broom millet, ready for manufacture .. ..	10	4
Farm seeds, including canary seed .. ..	12	7
Totals .. ..	168	80
<b>WOOL, ETC.—</b>		
Scoured wool .. ..	40	38
Greasy wool .. ..	60	59
Mohair .. ..	10	8
Totals .. ..	110	105
<b>MISCELLANEOUS PRODUCTS OF COMMERCIAL VALUE—</b>		
Wattle bark .. ..	15	12
Preserved skins .. ..	15	10
Marine shells .. ..	15	15
Tropical plants and foliage .. ..	10	5
Total .. ..	55	42
<b>LADIES' AND SCHOOLS' WORK AND FINE ARTS—</b>		
Needlework and knitting .. ..	25	20
Essay by pupil of school in district on "Value of Agri- culture and Dairying"; to be judged for writing and composition .. ..	10	9
Fine arts .. ..	5	2
School work, maps, writing, &c., by pupils of school in district .. ..	5	5
School needlework by pupils of schools in district .. ..	5	1
Totals .. ..	50	37
<b>ENLARGED PHOTOGRAPHS</b> .. ..		
	5	3
<b>EFFECTIVE ARRANGEMENT—</b>		
Comprehensiveness of view .. ..	20	18
Arrangement of sectional stands .. ..	25	18
Effective ticketing .. ..	10	6
General finish .. ..	25	16
Totals .. ..	80	58
Grand Totals .. ..	1,417	987

BUTTER AND CHEESE CONTESTS.

BUTTER FOR EXPORT.

Once again Oakey achieved a striking performance in the butter section. Of four classes of butter for export judged the Oakey Association was successful in three, thus adding more honours to their long list of previous successes in Brisbane and other capitals. Oakey was first in export butter, thirty days' storage, salted, with 95½ points; first in export butter, eight weeks' storage, salted, with similar points; and in export butter, eight weeks' storage, unsalted, they were again successful with 96 points. In export butter, eight weeks' storage, the Maryborough Company's Kingaroy factory was first with 95½ points, beating the Oakey factory by half a point only. Details:—

Thirty Days' Storage, Salted.

	Flavour.	Texture.	Colour.	Salting.	Packing and Finish	Total.
Possible points .. .. .	65	27	7	4	4	100
Oakey Creek District Co-operative Dairy Association, Ltd. .. .. .	60½	20	7	4	4	95½
Southern Queensland Dairy Co., Ltd. ..	60	20	7	4	4	95
Caboolture Co-operative Dairy Association, Ltd., Eumundi .. .. .	59½	20	7	4	4	94½
Warwick Co-operative Dairy Association, Ltd., Allora .. .. .	59	20	7	4	4	94
Wide Bay Co-operative Dairy Association, Ltd., Gympie .. .. .	58½	20	7	4	4	93½
Caboolture Co-operative Dairy Association, Ltd., Pomona .. .. .	59	19½	7	4	4	93½
Downs Co-operative Dairy Association, Ltd., Goombungee .. .. .	59	20	6½	4	4	93½
Maleny Co-operative Dairy Association, Ltd., .. .. .	58½	20	7	4	4	93½
Dayboro' Co-operative Dairy Association, Ltd. .. .. .	59	19½	6½	4	4	93
Downs Co-operative Dairy Association, Ltd., Miles .. .. .	58	20	7	4	4	93
Downs Co-operative Dairy Association, Ltd., Toowoomba .. .. .	58	20	7	4	4	93
Maryborough Co-operative Dairy Association, Ltd., Kingaroy .. .. .	58	20	7	4	4	93
Warwick Co-operative Dairy Association, Ltd., Mill Hill .. .. .	58½	19½	7	4	4	93
Caboolture Co-operative Dairy Association, Ltd., Caboolture .. .. .	58	19½	7	4	4	92½
Gayndah Co-operative Dairy Association, Ltd. .. .. .	58	19½	7	4	4	92½
Queensland Farmers' Co-operative Dairy Association, Ltd., Grantham .. .. .	58	19½	7	4	4	92½
Queensland Farmers' Co-operative Association, Ltd., Laidley .. .. .	58	20	7	3½	4	92½
Maryborough Co-operative Dairy Association, Ltd., Mundubbera .. .. .	57	20	7	4	4	92
Maryborough Co-operative Dairy Association, Ltd., Maryborough .. .. .	57	19½	7	4	4	91½
Wide Bay Co-operative Dairy Association, Ltd., Wide Bay .. .. .	57	19½	7	4	4	91½
Downs Co-operative Dairy Co., Ltd., Clifton .. .. .	57	19½	7	4	4	91½
Kin Kin Co-operative Dairy Association, Ltd. .. .. .	57	19½	7	4	4	91½
Queensland Farmers' Co-operative Association, Ltd., Booval .. .. .	56½	19½	7	4	4	91



BUTTER FOR EXPORT—*continued.*Thirty Days' Storage, Salted—*continued.*

	Flavour	Texture.	Colour.	Salting.	Packing and Finish	Total.
Possible points .. .. .	65	20	7	4	4	100
Logan and Albert Co-operative Dairy Association, Ltd. . . . .	57	19½	6½	3½	4	90½
Downs Co-operative Dairy Association, Ltd., Crow's Nest . . . . .	55	20	6½	4	4	89½
Queensland Farmers' Association, Ltd., Boonah . . . . .	55	19½	7	4	4	89½
Chinchilla Co-operative Dairy Association, Ltd. . . . .	55	19½	7	4	3½	89
Maryborough Co-operative Dairy Association, Ltd., Biggenden . . . . .	55	19	6½	4	4	88½

## Eight weeks' storage, unsalted.

Maryborough Co-operative Dairy Association, Ltd., Kingaroy . . . . .	60½	20	7	4	4	95½
Oakey District Co-operative Butter Association, Ltd. . . . .	60	20	7	4	4	95
Wide Bay Co-operative Dairy Association, Ltd., Gympie . . . . .	59½	20	7	4	4	94½
Downs Co-operative Dairy Association, Ltd., Miles . . . . .	58½	20	7	4	4	93½
Downs Co-operative Dairy Association, Ltd., Toowoomba . . . . .	58	20	7	4	4	93
Queensland Farmers' Co-operative Association, Ltd., Boonah . . . . .	58	20	7	4	4	93
Warwick Co-operative Dairy Association, Ltd., Mill Hill . . . . .	58	20	7	4	4	93
Port Curtis Co-operative Dairy Association, Ltd. . . . .	58	19½	7	4	4	92½
Caboolture Co-operative Dairy Association, Ltd., Pomona . . . . .	57	20	7	4	4	92
Downs Co-operative Dairy Association, Ltd., Clifton . . . . .	57	20	7	4	4	92
Downs Co-operative Dairy Association, Ltd., Goombungee . . . . .	57	20	7	4	4	92
Gayndah Co-operative Dairy Association, Ltd. . . . .	57	20	7	4	4	92
Queensland Farmers' Co-operative Association, Ltd., Booval . . . . .	57	20	7	4	4	92
Queensland Farmers' Co-operative Association, Ltd., Grantham . . . . .	57	20	7	4	4	92
Queensland Farmers' Co-operative Association, Ltd., Laidley . . . . .	57	20	7	3½	4	91½
Warwick Co-operative Dairy Association, Ltd., Allora . . . . .	57	19½	7	4	4	91½
Caboolture Co-operative Dairy Association, Ltd., Caboolture . . . . .	57	19½	7	4	4	91½
Caboolture Co-operative Dairy Association, Ltd., Eumundi . . . . .	56½	20	7	4	4	91½
Maryborough Co-operative Dairy Association, Ltd., Biggenden . . . . .	57	20	6½	4	4	91½
Maryborough Co-operative Dairy Association, Ltd., Maryborough . . . . .	57	19½	7	4	4	91½
Maleny Co-operative Dairy Association, Ltd. . . . .	56	19½	7	4	4	90½
Wide Bay Co-operative Dairy Association, Ltd., Cooroy . . . . .	56½	19½	6½	4	4	90½

BUTTER FOR EXPORT—*continued*.  
Eight Weeks' Storage, Unsalted—*continued*.

	Flavour.	Texture.	Colour.	Salting.	Packing and Finish.	Total.
Possible points .. .. .	65	20	7	4	4	100
Chinchilla Co-operative Dairy Association, Ltd. .. .. .	56	19½	6½	4	4	90
Dayboro' Co-operative Dairy Association, Ltd. .. .. .	56	19½	6½	4	4	90
Southern Queensland Dairy Co., Ltd. .. .. .	55	19½	6½	4	4	89
Kin Kin Co-operative Dairy Association, Ltd. .. .. .	55	19	6½	4	3½	88
Logan and Albert Co-operative Dairy Association, Ltd. .. .. .	54	19½	6½	4	4	88
Downs Co-operative Dairy Association, Ltd., Dalby .. .. .	52	20	7	4	4	87
Downs Co-operative Dairy Association, Ltd., Crow's Nest .. .. .	52	19½	6½	4	4	86
Maryborough Co-operative Dairy Association, Ltd., Mundubbera .. .. .	52	19½	6½	4	4	86

Eight weeks' storage, salted, manufactured in Queensland (from pasteurised cream),  
suitable for table use in Britain.

Oakey District Co-operative Butter Association, Ltd. .. .. .	61	20	7	4	4	96
Maryborough Co-operative Dairy Association, Ltd., Kingaroy .. .. .	60	20	7	4	4	95
Wide Bay Co-operative Dairy Association, Ltd., Gympie .. .. .	59½	20	7	4	4	94½
Downs Co-operative Dairy Association, Ltd., Miles .. .. .	59	20	7	4	4	94
Caboolture Co-operative Dairy Association, Ltd., Eumundi .. .. .	58½	20	7	4	4	93½
Downs Co-operative Dairy Association, Ltd., Toowoomba .. .. .	58½	20	6½	4	4	93
Queensland Farmers' Co-operative Association, Ltd., Grantham .. .. .	58	20	7	4	4	93
Kin Kin Co-operative Dairy Association, Ltd. .. .. .	58	19½	7	4	4	92½
Downs Co-operative Dairy Association, Ltd., Goombungee .. .. .	57	20	7	4	4	92
Maryborough Co-operative Dairy Association, Ltd., Maryborough .. .. .	57	20	7	4	4	92
Port Curtis Co-operative Dairy Association, Ltd. .. .. .	57	20	7	4	4	92
Warwick Co-operative Dairy Association, Ltd., Mill Hill .. .. .	57	20	7	4	4	92
Downs Co-operative Dairy Association, Ltd., Dalby .. .. .	56½	20	7	4	4	91½
Maryborough Co-operative Dairy Association, Mundubbera .. .. .	57	19½	7	4	4	91½
Warwick Co-operative Dairy Association, Ltd., Allora .. .. .	57½	19½	6½	4	4	91½
Queensland Farmers' Co-operative Association, Ltd., Booval .. .. .	56½	19½	7	4	4	91
Chinchilla Co-operative Dairy Association, Ltd. .. .. .	57	19½	6½	4	4	91
Downs Co-operative Dairy Association, Ltd., Clifton .. .. .	56½	19½	7	4	4	91
Maleny Co-operative Dairy Association, Ltd. .. .. .	57	19½	6½	4	4	91



BUTTER FOR EXPORT—*continued.*

Eight weeks' storage, salted, manufactured in Queensland (from pasteurised cream),  
suitable for table use in Britain—*continued.*

	Flavour.	Texture.	Colour.	Salting.	Packing and Finish.	Total.
Possible points .. .. .	65	20	7	4	4	100
Maryborough Co-operative Dairy Association, Ltd., Biggenden .. .. .	56½	19½	6½	4	4	90½
Caboolture Co-operative Dairy Association, Ltd., Pomona .. .. .	56	19½	6½	4	4	90
Downs Co-operative Dairy Association, Ltd., Crow's Nest .. .. .	54	20	7	4	4	89
Logan and Albert Co-operative Dairy Association, Ltd. .. .. .	55	19½	6½	4	4	89
Wide Bay Co-operative Dairy Association, Ltd., Cooroy .. .. .	55	19½	6½	4	4	89
Gayndah Co-operative Dairy Association, Ltd. .. .. .	54	19½	7	4	4	88½
Caboolture Co-operative Dairy Association, Ltd., Caboolture .. .. .	55	19	6	4	4	88
Queensland Farmers' Co-operative Association, Ltd., Boonah .. .. .	53	20	7	4	4	88
Queensland Farmers' Co-operative Association, Ltd., Laidley .. .. .	54	19½	7	3½	4	88
Southern Queensland Dairy Co., Ltd. .. .. .	54	19½	6½	3½	4	87½
Dayboro' Co-operative Dairy Association, Ltd. .. .. .	55	19	4	4	4	86

Eight weeks' storage, salted, no preservatives other than salt.

Oakey District Co-operative Butter Association, Ltd. .. .. .	60½	20	7	4	4	95½
Maryborough Co-operative Dairy Association, Ltd., Kingaroy .. .. .	60	20	7	4	4	95
Wide Bay Co-operative Dairy Association, Ltd., Gympie .. .. .	59½	20	7	4	4	94½
Caboolture Co-operative Dairy Association, Ltd., Eumundi .. .. .	58½	20	7	4	4	93½
Downs Co-operative Dairy Association, Ltd., Goombungee .. .. .	58½	20	6½	4	4	93
Queensland Farmers' Co-operative Association, Ltd., Boonah .. .. .	58	20	7	4	4	93
Port Curtis Co-operative Dairy Association, Ltd. .. .. .	58	20	7	4	4	93
Warwick Co-operative Dairy Association, Ltd., Mill Hill .. .. .	58	20	6½	4	4	92½
Queensland Farmers' Co-operative Association, Ltd., Laidley .. .. .	57½	19½	7	4	4	92
Downs Co-operative Ltd., Dalby .. .. .	57	19½	7	4	4	91½
Kin Kin Co-operative Dairy Association, Ltd. .. .. .	57	19½	7	4	4	91½
Wide Bay Co-operative Dairy Association, Ltd., Cooroy .. .. .	57	19½	7	4	4	91½
Maryborough Co-operative Dairy Association, Ltd., Biggenden .. .. .	57	19½	6½	4	4	91
Queensland Farmers' Co-operative Association, Ltd., Booval .. .. .	57	19½	6½	4	4	91
Warwick Co-operative Dairy Association, Ltd., Allora .. .. .	56	19½	6½	4	4	90
Caboolture Co-operative Dairy Association, Ltd., Caboolture .. .. .	56½	19	6½	4	4	90
Gayndah Co-operative Dairy Association, Ltd. .. .. .	55	19½	7	4	4	89½

BUTTER FOR EXPORT—continued.

Eight weeks' storage, salted, no preservatives other than salt—continued.

	Flavour.	Texture.	Colour.	Salting.	Packing and Finish.	Total.
Possible points .. .. .	65	20	7	4	4	100
Maryborough Co-operative Dairy Association, Ltd., Mundubbera .. .. .	55	19½	7	4	4	89½
Caboolture Co-operative Dairy Association, Ltd., Pomona .. .. .	56	19	6½	4	3½	89
Maleny Co-operative Dairy Association, Ltd. .. .. .	55	19½	6½	4	4	91
Maryborough Co-operative Butter Association, Ltd., Maryborough .. .. .	55	19½	6½	4	4	89
Queensland Farmers' Co-operative Association, Ltd., Grantham .. .. .	55	19½	6½	4	4	89
Chinchilla Co-operative Dairy Association, Ltd. .. .. .	54	19½	6½	4	4	88
Downs Co-operative Dairy Association, Ltd., Clifton .. .. .	55	19½	6½	4	4	89
Southern Queensland Dairy Co., Ltd. .. .. .	54	19½	6½	4	4	88
Downs Co-operative Dairy Association, Ltd., Crow's Nest .. .. .	53	19½	6½	4	4	87

CHEESE FOR EXPORT.

A remarkable sequence of successes was scored by the Pittsworth Dairy Company, Limited, in the cheese section of the dairy produce contests. Its "P" factory won the competition for export cheese, white, with the very high points of 96½ out of a possible 100. The company also filled second and third places in this class. In the export cheese, coloured class, the company's "P" factory was again successful with 95¼ points, and in the medium cheese class, over two months old, exceeding 40 lb., the same factory was placed first with 95½ points. The company registered its fourth successive win in the class, medium cheese, under six weeks old, not exceeding 40 lb., with 94½ points. Details:—

Export, white, suitable for English market; two, each 70 lb. to 80 lb.; six weeks' storage.

	Flavour.	Texture.	Colour.	Finish.	Total.
Possible points .. .. .	50	25	15	10	100
Pittsworth Dairy Co., Ltd., "P" Factory .. .. .	46½	25	15	10	96½
Pittsworth Dairy Co., Ltd., "Y" Factory .. .. .	46	25	14¾	9¾	95½
Pittsworth Dairy Co., Ltd., "T" Factory .. .. .	45½	25	15	9¾	95¼
Downs Co-operative Dairy, Ltd., Lilyvale .. .. .	45	24¼	15	10	94¼
Downs Co-operative Dairy, Ltd., Boodua .. .. .	44	25	15	10	94
Downs Co-operative Dairy, Ltd., Westbrook .. .. .	45	25	14½	9½	94
Yargullen Co-operative Dairy, Ltd. .. .. .	44	24½	15	9¾	93¼
Downs Co-operative Dairy, Ltd., Koondai .. .. .	43	25	14¾	9¾	92½
Southbrook Co-operative Dairy Co., Ltd. .. .. .	43	25	15	9½	92½
Mount Tyson Farmers' Co-operative Dairy Co., Ltd. .. .. .	43	25	15	9¼	92¼
Pittsworth Dairy Co., Ltd., "E" Factory .. .. .	42	25	15	9½	91½
Biddeston Co-operative Dairy, Ltd. .. .. .	42	24½	15	9½	91
Oakey District Co-operative Butter Association, Ltd., Kelvinhaugh .. .. .	39	25	15	9½	88½



CHEESE FOR EXPORT—*continued.*

Export, coloured, suitable for English market; two, each 70 lb. to 80 lb.; six weeks' storage.

	Flavour.	Texture.	Colour.	Finish.	Total.
Possible points .. .. .	50	25	15	10	100
Pittsworth Dairy Co., Ltd., "P" Factory ..	46	25	14 $\frac{3}{4}$	10	95 $\frac{3}{4}$
Irongate Co-operative Dairy Association, Ltd. ..	45 $\frac{1}{2}$	24 $\frac{3}{4}$	14 $\frac{3}{4}$	9	94
Mount Tyson Farmers' Co-operative Dairy Co., Ltd. .. .. .	44 $\frac{1}{2}$	25	14 $\frac{3}{4}$	9 $\frac{1}{4}$	93 $\frac{1}{2}$
Downs Co-operative Dairy Co., Ltd., Westbrook ..	43	25	15	9 $\frac{3}{4}$	92 $\frac{3}{4}$
Yargullen Co-operative Dairy Association, Ltd. ..	44	24 $\frac{1}{2}$	14 $\frac{3}{4}$	9 $\frac{1}{2}$	92 $\frac{3}{4}$
Downs Co-operative Dairy Association, Ltd., Koondai .. .. .	43	24 $\frac{3}{4}$	15	9 $\frac{3}{4}$	92 $\frac{1}{2}$
Downs Co-operative Dairy Association, Ltd., Lilyvale .. .. .	43	24 $\frac{1}{2}$	15	9 $\frac{3}{4}$	92 $\frac{1}{4}$
Pittsworth Dairy Factory, Ltd., "T" Factory ..	43	25	15	9 $\frac{1}{2}$	92 $\frac{1}{2}$
Southbrook Co-operative Dairy Co., Ltd. .. ..	43	25	15	9 $\frac{1}{2}$	92 $\frac{1}{2}$
Pittsworth Dairy Factory, Ltd., "E" Factory ..	43	24 $\frac{1}{2}$	15	9 $\frac{1}{2}$	92
Warwick Co-operative Dairy Association, Ltd., Bony Mountain .. .. .	43	24 $\frac{1}{2}$	14 $\frac{1}{2}$	9 $\frac{1}{2}$	91 $\frac{1}{2}$
Warwick Co-operative Dairy Association, Ltd., Greymare .. .. .	43	24 $\frac{1}{2}$	14 $\frac{1}{2}$	9 $\frac{1}{2}$	91 $\frac{1}{2}$
Oakey District Butter Association, Ltd., Kelvinhaugh .. .. .	42	24 $\frac{1}{2}$	15	9 $\frac{1}{2}$	91
Pittsworth Dairy Co., Ltd., "Y" Factory .. ..	42	24 $\frac{1}{2}$	14 $\frac{1}{2}$	10	91
Biddeston Co-operative Dairy Association, Ltd. ..	41 $\frac{1}{2}$	25	14 $\frac{3}{4}$	9 $\frac{3}{4}$	91
Malling Co-operative Dairy Association, Ltd. ..	42	24 $\frac{1}{2}$	15	9 $\frac{1}{2}$	91
Oakey District Co-operative Butter Association, Ltd., Crosshill .. .. .	42	24 $\frac{3}{4}$	14 $\frac{3}{4}$	9 $\frac{1}{4}$	90 $\frac{3}{4}$

Medium cheese, over 2 months' old; two, each not exceeding 40lb.

Pittsworth Dairy Co., Ltd., "P" Factory ..	45 $\frac{1}{2}$	25	15	10	95 $\frac{1}{2}$
Irongate Co-operative Dairy Association, Ltd. ..	44	25	14 $\frac{3}{4}$	9 $\frac{1}{2}$	93 $\frac{1}{4}$
Mount Tyson Farmers' Co-operative Dairy Co., Ltd. .. .. .	44	24 $\frac{1}{2}$	14 $\frac{3}{4}$	9 $\frac{1}{2}$	92 $\frac{3}{4}$
Oakey District Co-operative Butter Association, Ltd., Crosshill .. .. .	42 $\frac{1}{2}$	25	15	9	91 $\frac{1}{2}$
Southbrook Co-operative Dairy Co., Ltd. ..	42	24 $\frac{3}{4}$	15	9 $\frac{3}{4}$	91 $\frac{1}{2}$
Malling Co-operative Dairy Association, Ltd. ..	42 $\frac{1}{2}$	24 $\frac{1}{2}$	14 $\frac{3}{4}$	9 $\frac{1}{2}$	91 $\frac{1}{4}$
Downs Co-operative Dairy Association, Ltd., Westbrook .. .. .	42	24 $\frac{1}{2}$	14 $\frac{1}{2}$	9 $\frac{3}{4}$	90 $\frac{3}{4}$
Downs Co-operative Dairy Association, Ltd., Koondai .. .. .	42	24 $\frac{1}{2}$	14 $\frac{3}{4}$	9 $\frac{1}{2}$	90 $\frac{3}{4}$
Pittsworth Dairy Co., Ltd., "Y" Factory ..	42 $\frac{1}{2}$	24 $\frac{3}{4}$	14	9 $\frac{1}{2}$	90 $\frac{3}{4}$
Downs Co-operative Dairy Association, Ltd., Lilyvale .. .. .	41	24 $\frac{3}{4}$	14 $\frac{1}{2}$	10	90 $\frac{1}{4}$
Oakey District Co-operative Butter Association, Ltd., Kelvinhaugh .. .. .	41	24 $\frac{3}{4}$	15	9 $\frac{1}{2}$	90 $\frac{1}{4}$
Downs Co-operative Dairy Association, Ltd., Boodua .. .. .	41	24 $\frac{1}{2}$	14 $\frac{1}{2}$	9 $\frac{3}{4}$	89 $\frac{3}{4}$
Sunnyvale Co-operative Cheese Association ..	40	24 $\frac{1}{2}$	14 $\frac{1}{2}$	9 $\frac{3}{4}$	88 $\frac{3}{4}$
Pittsworth Dairy Co., Ltd., "E" Factory ..	39	24 $\frac{1}{2}$	15	10	88 $\frac{1}{2}$
Coalstoun Lakes Co-operative Dairy Association, Ltd. .. .. .	40	24 $\frac{1}{2}$	14	9 $\frac{1}{2}$	88
Yargullen Co-operative Dairy Association, Ltd. ..	39	25	15	9	88
Warwick Co-operative Dairy Association, Ltd., Greymare .. .. .	40	24	14	7	85

CHEESE FOR EXPORT—*continued.*

Medium Cheese, under 6 weeks' old; two, each not exceeding 40 lb.

	Flavour.	Texture.	Colour.	Finish.	Total.
Possible points .. .. .	50	25	15	10	100
Pittsworth Dairy Co., Ltd., "P" Factory ..	45	24 $\frac{3}{4}$	14 $\frac{3}{4}$	10	94 $\frac{1}{2}$
Mount Tyson Farmers' Co-operative Dairy Co., Ltd. ..	44 $\frac{1}{2}$	24 $\frac{3}{4}$	15	9 $\frac{1}{2}$	93 $\frac{3}{4}$
Biddeston Co-operative Dairy Association, Ltd. ..	44	25	14 $\frac{3}{4}$	9 $\frac{3}{4}$	93 $\frac{1}{2}$
Downs Co-operative Dairy Association, Ltd., Westbrook ..	43	25	15	9 $\frac{3}{4}$	92 $\frac{3}{4}$
Downs Co-operative Dairy Association, Ltd., Koondai ..	43	25	15	9 $\frac{1}{2}$	92 $\frac{1}{2}$
Oakey District Co-operative Butter Association, Ltd., Crosshill ..	43	24 $\frac{3}{4}$	14 $\frac{3}{4}$	9 $\frac{1}{4}$	91 $\frac{3}{4}$
Pittsworth Dairy Co., Ltd., "Y" Factory ..	43	24 $\frac{1}{2}$	14 $\frac{3}{4}$	9 $\frac{1}{2}$	91 $\frac{3}{4}$
Downs Co-operative Dairy Association, Ltd., Lilyvale ..	42	25	15	9 $\frac{1}{2}$	91 $\frac{1}{2}$
Yargullen Co-operative Dairy Association, Ltd. ..	43 $\frac{1}{2}$	24 $\frac{1}{2}$	14 $\frac{1}{2}$	9	91 $\frac{1}{2}$
Southbrook Dairy Co., Ltd. ..	42	24 $\frac{1}{2}$	15	9 $\frac{3}{4}$	91 $\frac{1}{4}$
Oakey District Co-operative Butter Association, Ltd., Kelvinhaugh ..	42	24 $\frac{1}{2}$	14 $\frac{1}{2}$	9 $\frac{3}{4}$	90 $\frac{3}{4}$
Greenmount Dairy Co., Ltd. ..	42	24 $\frac{1}{2}$	14 $\frac{1}{2}$	9 $\frac{1}{2}$	90 $\frac{1}{2}$
Malling Co-operative Dairy Association, Ltd. ..	41	25	15	9 $\frac{1}{2}$	90 $\frac{1}{2}$
Pittsworth Dairy Co., Ltd., "E" Factory ..	41	25	15	9 $\frac{1}{2}$	90 $\frac{1}{2}$
Downs Co-operative Dairy Association, Ltd., Boodua ..	41	24 $\frac{1}{2}$	14	9 $\frac{1}{2}$	89
Pittsworth Dairy Co. Ltd. "D" Factory ..	40	24 $\frac{1}{2}$	14 $\frac{1}{2}$	8	87
Irongate Co-operative Dairy Association, Ltd. ..	39	24	14 $\frac{1}{2}$	9	86 $\frac{1}{2}$
Sunnysvale Co-operative Cheese Association ..	37	24	14	9 $\frac{1}{2}$	84 $\frac{1}{2}$
Coalstoun Lakes Co-operative Dairy Association, Ltd. ..	37	24	14	9	84
Warwick Co-operative Dairy Association, Ltd., Greymare ..	38	24	14	8	84

## CARE OF THE FARM TEAM.

In a paper on this subject, at a recent farmers' meeting in South Australia, a local farmer, Mr. A. Cornish, said when buying or breeding horses an endeavour should be made to get an even team both in size and pace. It was advisable to breed two or three foals every year to keep up the strength of the team. Horses should always be watered before feeding, otherwise the food would not be digested. One should keep a regular time for feeding and watering the horses, and if possible they should be watered three times a day, especially during harvest. The water trough should be as close to the stables as possible, but not in the yard, because the horses would pick up a mouthful of hay and drop it across the yard as they went for a drink, and also drop chaff in the water. The horses should be stable-fed during seeding. He would feed with chaff for breakfast and dinner, and for tea as much hay as they would clean up with the last feed of chaff. The horses would do better if given bran or oats with their chaff. They should be tied up for feeding; that allowed each animal to have a fair share of the food. The horses should be groomed every morning, before harnessing. If one could not spare the time for that, at least the shoulders should be brushed to remove sweat. Grooming was also a preventive of sore shoulders. The harness should be made to fit properly; the collar should be fairly tight. Ninety per cent. of sore shoulders was caused through loose and ill-fitting collars. If backbands were used they held the collar up, and so helped to prevent sore shoulders; they also had a tendency to keep the team from tossing their heads. When using ten or more horses, the team should be worked in tandem to do away with a number of swings, and keep the horses in front of the implement. Horses should never be worked after sunset, especially during the winter months, because there was no evaporation, and their shoulders were more inclined to scald. The stables should be cleaned out regularly.





PLATE 85. Food for the Million—Part of the Great Show in the Meat Hall.

# THE MEAT INDUSTRY.

## THE POSITION REVIEWED.

ECONOMICS OF MEAT PRODUCTION—THE NEED OF EFFECTIVE ORGANISATION—A NATIONAL ADVISORY BOARD SUGGESTED—NO NEED FOR PESSIMISM—QUEENSLAND THE CATTLE STATE OF THE COMMONWEALTH—“QUEENSLAND’S BEST EQUAL TO THE BEST OF ANY OTHER COUNTRY.”

The general economics of the live stock and meat industry were reviewed by the Acting Premier, Mr. W. Forgan Smith, and a number of leaders in the cattle world on the occasion of the official opening of the Meat Hall at the Brisbane Exhibition on 8th August.

Mr. E. F. Sunners, Honorary Council Steward of the Royal National Association, read a very informative paper on the “Economics of Meat Production,” in the course of which he suggested the creation of a national advisory board to control the meat industry of the Commonwealth.

The necessity for organising the meat industry was stressed strongly by Mr. Forgan Smith and others, and the general consensus of the gathering was that, by effective organisation, Australia would be in a position to take her proper place as one of the biggest producing countries of the world, and remain for all time the main supplier to the markets of Great Britain.

A report of the proceedings, including the text of Mr. Sunners’s valuable paper, is presented in the following pages, and will no doubt be read with interest by all concerned in the stability and advancement of our pastoral industry.—Ed.

The Live Stock and Meat Industry Hall was officially opened by the Acting Premier (Mr. W. Forgan Smith) at the Show Ground on 8th August.

Mr. Ernest Baynes (president of the Royal National Agricultural and Industrial Association) explained that the idea of a meat industry exhibit originated from the Metropolitan Meat Industry Board of New South Wales, which had a somewhat similar, but not nearly so comprehensive, display at the last Royal Show in Sydney. He thanked the Queensland Government for its financial assistance, the Metropolitan Meat Industry Board of New South Wales for allowing Mr. W. H. Paine to come over and help them with the exhibits, Mr. Robert Joyce for the loan of the Lightfoot (Linde) refrigerating plant, Mr. Richard Gailey, the architect, and Mr. E. F. Sunners, the “guiding force” of the exhibit.

### The Importance of the Pastoral Industry.

The Acting Premier (Mr. W. Forgan Smith), in officially opening the hall, said the Royal National Association was to be congratulated heartily on its enterprise and public-spiritedness. One realised, on going around the pavilion, how important the meat industry was to Queensland, and how interdependent the various industries were on the primary industry. “The cattle industry is not in a good position at the present time, nor has it been since the great slump in prices that followed the Great War,” said Mr. Smith. “The men who are engaged in this industry have been carrying on under very great difficulties, and it is necessary for an exhibit of this kind to bring home to the people exactly what the industry means to them. There is no need for pessimism, however. There is no need to get your tails down and cry out in despair. Queensland is a great cattle-producing State. We should take stock of the facts of the situation, realise the problems involved, and apply our minds to the solution of them. What other countries have done, we can do.”





PLATE 86.—Pig PRODUCTS DISPLAY IN THE MEAT HALL.

**"Queensland's Best Equal to the Best of any other Country."**

Mr. Smith went on to say that the industry needed organisation in all its branches—production, treatment, and distribution of the product. It must meet organisation by organisation, efficiency by equal efficiency, at the very least. It was only along those lines that improvement could be effected. "Queensland's best is equal to the best of any State or of any other country. Nothing but the best is good enough for Queensland," he declared amidst sustained applause. He wished the association every success in the worthy enterprise it had launched. It gave him the greatest pleasure to declare the fine hall and the exhibition contained therein open.

Mr. W. J. Affleck (chairman of the council of the Royal National Agricultural and Industrial Association of Queensland) said: "We are in the business for the benefit of Queensland. Our hearts are in it." The meat industry exhibits would be an eye-opener, not only to sheep and cattle men, but to all citizens who visited the Show. This section, like all the others in the Show, had been organised for the benefit of the State. The new hall had cost nearly £3,000.

**THE ECONOMICS OF MEAT PRODUCTION.****A NATIONAL ADVISORY BOARD SUGGESTED.**

Mr. E. F. Sunners (Honorary Council Steward of the Royal National Agricultural and Industrial Association) read an informative paper on the economics of the industry, and suggested the setting up of a national advisory board. Following is the text of his useful contribution to current discussion on the position of the pastoral business:—

Attention is being called daily to the very critical condition of the live stock and meat industry of Australia, the beef cattle industry in particular, said Mr. Sunners. The production of beef cattle is carried on more extensively in Queensland than in any other State of the Commonwealth, the percentage of the cattle herd in the respective States as at the end of 1925 being about as follows:—Queensland, 49.52; New South Wales, 22.08; Victoria, 11.62; South Australia, 2.86; Western Australia, 5.81; Northern Territory, 6.56; Tasmania, 1.65. Of the cattle in the Northern Territory, probably 40 per cent. of the yield finds its way into Queensland, and, to some extent, South Australia. The balance of the Northern Territory yield seems to be disposed of by way of export as live cattle from Port Darwin or treated through the Wyndham works. This review particularly deals with conditions applying to 40 per cent. of the herd of the Northern Territory, as well as the herds of Queensland, New South Wales, Victoria, and South Australia; or, in other words, the herd of the eastern side of Australia, which equals about 87 per cent. of the total Commonwealth herd. It specifically covers the condition of the industry in Queensland, as this State has about 57 per cent. of the herd of the eastern side of Australia, and, to a large extent, is the key to the beef supply of this portion of the Commonwealth.

**Outstanding Features.**

The main outstanding features of the industry are as follows:—(1) The producer sees little or no encouragement toward the production of cattle, particularly of good quality. (2) There is undoubtedly room for some better form of industrial organisation in respect to the domestic trade, particularly as the domestic consumption of the Eastern States of Australia absorbs 80 per cent. of the production, and is regularly expanding. (3) The export trade is now conducted under conditions which are unfavourable towards the successful functioning of this division of the industrial organisation, and prohibitive in competition with other beef exporting countries. (4) The movement of live cattle from Queensland to other States is extensive, and, to some extent, this manner of distribution could be improved upon with advantage to the producers of Queensland and consumers of Southern States. It would seem that a proper solution of these main features is fundamental to the welfare and prosperity of the industry, and, therefore, the existing conditions under each of these headings calls for close scrutiny.

**The Producer's Problem.**

The average approximate export price paid in Queensland for bullocks for the years 1912 to 1927 (per 100 lb. delivered weight) was shown on a chart. The Southern Queensland price, on the average, now appears to be only slightly higher than in 1913, possibly 10 per cent. to 15 per cent., but the Northern price to-day is actually less than it was in 1913, approximately 10 per cent., Mr. Sunners continued. The cost of droving and railage has increased considerably, so that the producer's problem is the making of less than pre-war returns to cover post-war expenditure.





PLATE 87.—STRIKING PANELS IN THE MEAT HALL.  
What Scientific and Industrial Research means to the Rural Producer.

Prices have been on the low level since 1921, and the general condition and quality of the herd is undoubtedly reflecting the low value of cattle. Had Queensland's production of beef been sufficient for domestic requirements only, the cost of beef to the consumer, no doubt, would have been on a higher price level than it has been during the past few years. The available supply, however, has been in excess of the domestic demand, and for the years 1920 to 1925 the average yearly surplus, over and above domestic and interstate requirements, has amounted to about 300,000 cattle, equal to 36 per cent. of the total production. This surplus influences the value of the total production, for the reason that, if the exportable parity is on a low level, then in effect, the total yield is first available for domestic consumption, until the over-supply bears the domestic price down to the price at which the exporters can afford to purchase. For the time being, at least, the oversea value seems to have reached and settled on a low price level, being influenced in this direction by the diminished purchasing power of the people of Great Britain and the Continent; also by the fact that the industry of the Argentine and Uruguay appears to be able to meet such a situation, as the supply of beef from these countries has been well maintained. In regard to the disposition of the total Queensland production, domestic requirements have absorbed about 34 per cent., interstate 30 per cent., leaving a surplus of the production for export amounting to 36 per cent.

### Higher Production Costs.

It was to be expected that the cost of production, even under normal conditions, would show an upward tendency, but with industry properly organised, and functioning along sound lines, it no doubt would respond to this tendency, and maintain a balance between production and consumption. It is not to be expected, however, that in so short a period industry could respond to the accelerated cost of production of the past twelve years; firstly, due to the general effect of the war, and, secondly, to the particular effect of the protective policy of the Commonwealth. It is questionable, however, whether the industrial organisation connected with the meat industry has been able to offset even what might have been the normal increase in production cost, so that, with an export parity for the surplus which does not cover the increase, and with the domestic retail price level apparently fixed without regard to quality, or the real cost of production and marketing, it would appear quite understandable why the breeding and fattening of cattle cannot be otherwise than a discouraging business, and why the quality of the herd is deteriorating.

### A Vital Industry.

The meat industry is a big vital industry. It should be regarded as one of the most important of the country, but there are economic principles connected with it that must be understood and recognised, not only by Governments, but also by the producer; and it is a further essential that the industrial organisation connected with it must be of such a character as to be able to function efficiently, and so organised as to be in a position to meet each successive demand in the changing conditions of national life. A close examination of the respective divisions of the industrial organisation should be made, to ascertain whether or not they are of this character. In respect to the slaughtering of live stock in Queensland for domestic requirements, it is found that this function is mainly performed by local butchers, whose business does not extend beyond supplying the demand for meat in their immediate vicinity. The domestic killing establishments are numerous, and the type of establishment does not permit of operations being conducted on a large scale, and, due to the absence of refrigeration and modern equipment, the full value of by-products cannot be obtained. As domestic requirements have expanded in this State, they have been met by a larger number of these small units, rather than by an expansion of the units themselves. Consequently there has been no progress in the direction of large scale utilisation of by-products, which is practicable only in large plants, being made possible by the use of refrigeration, and a volume of killing which justifies the installation of the necessary plant and equipment. Anything in the nature of the study of the arts and sciences connected with the meat industry appears to be entirely lacking, likewise any attention to more economic methods of merchandising. Although the domestic organisation of the State is responsible for the treatment of approximately one-third of the production, it would seem, in its present form, it cannot apply the necessary means to enable it to reduce the spread between producer and consumer. It would seem that some better type of organisation is long overdue wherever practicable—that is, in such cities and towns where the consumption is large enough to enable a modern type of plant to function. To some extent the Southern States have concentrated the domestic killing into larger units, but in these States, also, there is undoubtedly a necessity for an extension of the system before the domestic organisation can fulfil its requirements.



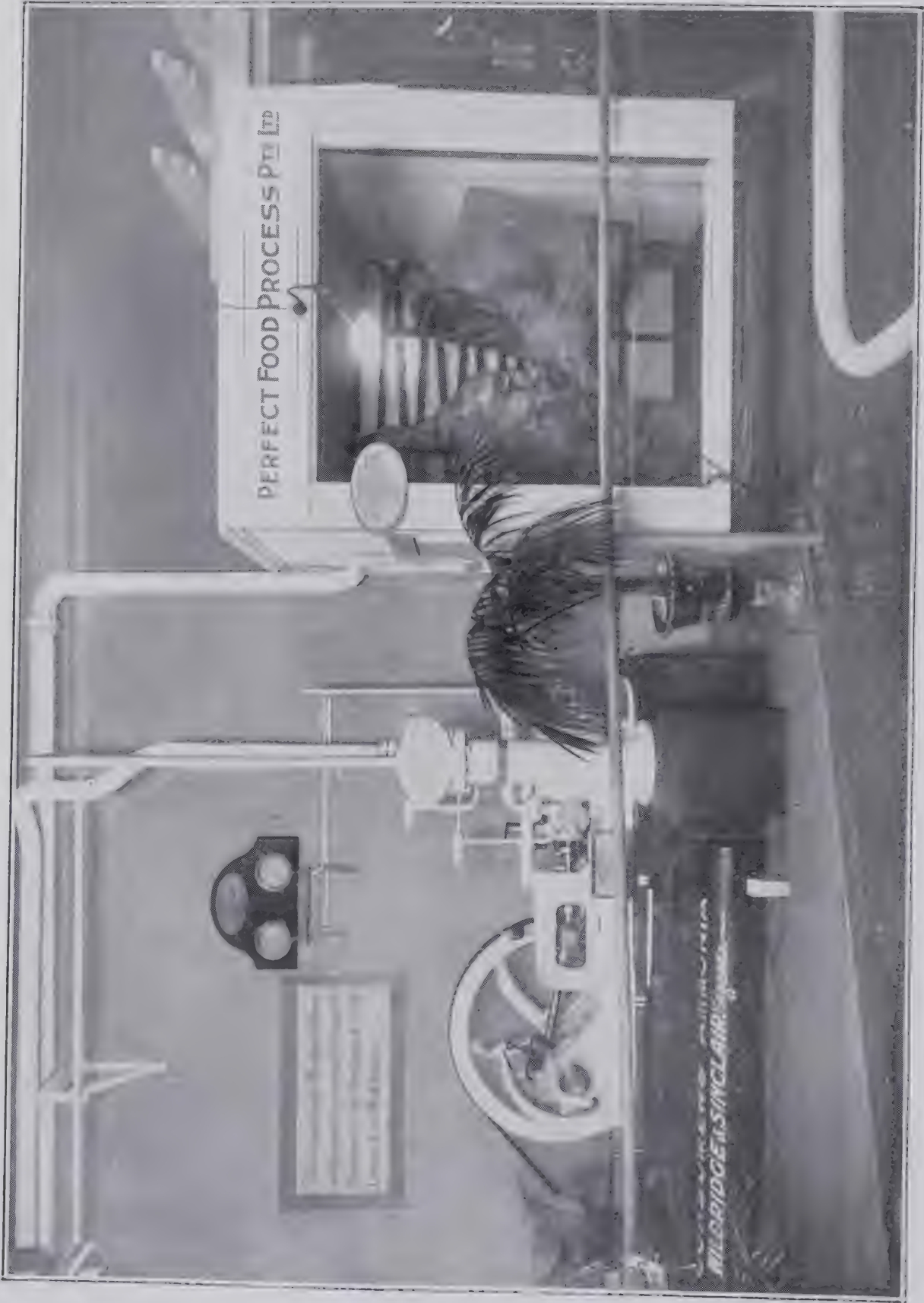


PLATE 88.—THE ENGINE-ROOM IN THE MEAT HALL.

### **The Industry's Competitive Capacity.**

The export division consists of twelve plants, constructed at intervals from 1884 to 1914. The earlier type of construction differs materially from the modern plant design. The daily capacity of the respective works varies considerably. By reason of the Queensland export killing being concentrated into a short period of the year, a much larger capacity must be provided in proportion to annual volume than in the Argentine, where the killing extends throughout the year. In comparison to such a competitive country, where the working load is regular and economical, the Queensland plants, over an average of years, operated a little more than six months of the year, and during this short period used approximately but 56 per cent. of their combined capacity. Of course, the position of the individual plants varies, but the industry must be viewed from the aspect of its competitive capacity as a national unit. During the operating season the working load is very irregular, the full combined capacity being in use for possibly a month or two only. Mr. Sunners exhibited a chart showing the course of the maximum average and minimum load during the past twelve years. This method of working, he said, resulted in the operating period being saddled with the overhead expense of a very large idle period. He exhibited another chart illustrating the position as compared with an industry operating regularly, indicating that the overhead burden of the Queensland industry would be about three times greater per unit of product treated.

### **Export Organisation.**

The average yearly tonnage of export meat products treated in the Argentine, Uruguay, and Australia for the years 1922 to 1926, inclusive, was shown on another chart, and he pointed out that the very large volume of business of the South American plants enabled them to secure lower operating costs in directions other than overhead. Another chart showed the monthly shipments of beef quarters from South America and Australia for 1926; but it was mentioned that it was unusual for Queensland to be shipping beef during the early months of the year. By the regular marketing of live stock the South American producers enable the exporters to operate their plants continuously, and furnish a steady flow of meat to the consuming markets, which has enabled the exporters to establish large selling organisations that can be depended upon to meet the daily needs of the people, Mr. Sunners said. There the respective branches of the industry are in harmony—production, manufacture, and distribution—so that, as an industrial organisation, it is both impressive and powerful. With them labour is permanently employed. In Queensland it is but casual, which does not promote satisfactory industrial relations. In comparison with the industry of South America, the exporters of this country have several outstanding disabilities, and it would appear that, without at least some partial solution of these root problems, the export industry must continue to languish. The stock returns as at the end of 1926 show a loss of 1,148,558 cattle, a little less than half the herd which yields the export surplus, indicating the exporters will suffer a heavy reduction in volume over the course of the next few years, further accentuating the disadvantage of this country. If the export business is to continue, the producer must recognise these problems, for, after all, the export industrial organisation cannot serve the market any better than the producer serves it with the basic raw material. Irregularity of supplies and indifferent quality will never secure the goodwill of the buying public in any market.

### **Interstate Trade.**

Whether the movement of cattle to Southern States is economic depends, of course, on the locality from which the supply is drawn. No doubt, particularly in regard to store cattle, a certain number can be moved to advantage in this manner. Including fat cattle, the total border trade appears to amount to 30 per cent. of the Queensland yield, but in estimating the available cattle in the locality which might favour this trade, it appears that at least one-third of the supply could be killed in Brisbane to advantage, and shipped as chilled beef. Undoubtedly, too, this trade is expanding, and it may be no great length of time before the coastal areas will furnish large supplies in this direction. To rail live cattle from Brisbane to Sydney would be an economic waste, inasmuch as the cost of railage, and loss through shrinkage, would probably amount to from 30s. to 37s. more per head than the cost of shipping the chilled carcase. A close study of the distribution of live stock and population of the Eastern States of Australia, as at the end of 1925, shows that about 59 per cent. of the cattle, and 16 per cent. of the population, is in Queensland, while 41 per cent. of the cattle, and 84 per cent. of the population, is in the Southern States—New South Wales, Victoria, and South Australia. It further indicates that, if the herd remains about stationary at the 1925 level, the domestic requirements will absorb the equivalent of the present exportable surplus within fifteen years, and well within this period, if the subsequent decrease in the



Queensland herd is not in the meantime restored. It would appear that the time is not far distant when Queensland should be furnishing the Southern States with double the quantity of beef now supplied, and it would seem, therefore, that this is a feature of the industry which will call for systematic development, so that the producers of Queensland, and the consumers of Southern States, can both participate in the benefits of economic distribution. There is a further matter which should be mentioned at this juncture. It is thought in some directions that the production of cattle in Queensland should be permitted to languish until the domestic demand actually overtakes the supply, and that by doing so the producers' problem will be solved. It is perfectly evident, however, that the supply of cattle can never be adjusted to meet the daily requirements of the people, as there will always be months of heavy and corresponding months of light marketing; and, again, years which favour a large, and years which favour a small production. The herd should, therefore, be maintained on a level that ensures sufficient margin to provide for these variations, and, until the limit of resources has been reached, it is economically sound that some measure of surplus should be maintained, not only in the interests of the people in Queensland, but in the interests of the people in the Southern States, who, without supplies from Queensland to make up the shortage in their respective States, would have to be content with less beef or pay fancy prices for it. No primary industry that manages its affairs in this manner can expect to hold the goodwill of the people. Service only is recognised. Irregularity of supplies and price fluctuations will not promote meat consumption, which is a feature the producers must not lose sight of. This completes the examination of the three divisions operating between producer and consumer, and undoubtedly confirms that, under present conditions, the domestic and export industrial organisations cannot respond to higher production costs; also that the interstate business is not developing along economic lines, due to the domestic organisation not being equipped for, and the irregularity of the exporters' business not permitting, a thorough development of this trade.

### **Production.**

The live stock producer has duties and responsibilities which are fundamental to his own prosperity. First, the supply of live stock should be large enough to permit profitable utilisation of the plant, and equipment of the industrial organisation, but on this point it is obvious that an adjustment of the capacity is necessary. Second, the supply, while necessarily varying with seasonal conditions, should be distributed throughout the year as evenly as possible, thus equalising labour and consumption needs. Third, the character of the live stock, in size, quality, and finish, should be such as to meet the needs and desires of the consuming public. The producer must specialise in the breeding of live stock, just as those engaged in any other enterprise must specialise in their particular functions, would they be successful. It is not sufficient that such questions as loss through ticks and bad branding, or damage from horns, bruising, &c., should be matters of opinion. There must be finality on these questions. Of course, producers naturally wish to make a profit, and unless they do make a profit year by year, on an average, production is discouraged.

### **Where the Industry Stands To-day.**

This is where the cattle industry stands to-day, and, while it is a complex problem, it nevertheless must be straightened out, and undoubtedly it is time to begin, otherwise the undertaking will be more difficult later on. The first objective must be towards encouraging more and better production, and the surest way to do so is to concentrate upon reducing the spread between producer and consumer. This can be effected only through a form of industrial organisation suitable to the period, which can secure real economies in operating, and the fullest value for by-products. Any undue burden with which production is saddled should be reconsidered, so that the cattle business, in all its phases, might be stimulated within as short a time as possible. It is an essential industry, and one which cannot be confined to the boundaries of the respective States; and, although it is of a national character, there is perhaps no industry in Australia to-day so lacking in organisation, and the co-ordination of each party to it. It is an industry which can prosper only when each party to it not only performs his functions efficiently, but when all work together, and with full recognition of their respective duties and responsibilities. It may be taken for granted, therefore, that until each group connected with the industry is working in the one direction, and with a common understanding of each other's problems, no definite progress can be made. It is not to be expected that any type of organisation consisting of one group only could make any effective headway. Countries which have succeeded in lifting the live stock and meat industry to a high state of efficiency have done so through the co-ordination suggested, with the industrial organisation furnishing the constructive force for the benefit of all groups.

### **Attempts Towards Organisation.**

During the past few years several schemes have been suggested for the improvement of the Australian live stock and meat industry, the beef cattle industry in particular, culminating in the formation of the Australian Meat Council, which, after functioning for a few years, was disbanded. The Commonwealth Government has certainly been sympathetic, and has endeavoured to find a solution to the problem. It is now proposed to establish an Australian Meat Board, with subsidiary boards in each State, the functions of which will be to promote the interests of meat producers in the production, sale, and marketing of their products; to confer with the exporters and with the Commonwealth and State Governments. The needs of the live stock and meat industry of Australia, however, appear to be much greater than the relief any such organisation can be expected to afford. Concentrating upon the exportable surplus of 20 per cent. of the yield, and overlooking the fact that 80 per cent. of the production is a domestic matter, has probably contributed more than anything else to the present unsatisfactory state of the cattle industry. The apparent indifference to quality for the domestic trade; the out-of-date methods of treatment of the greater portion of the stock treated; an almost entire absence of analytical chemistry and scientific research; and the lack of organisation and co-operation, could hardly be expected to result in any other condition. The maintenance of an exportable surplus is important, but, in proportion, it would seem to be a secondary matter when any scheme for the reorganisation of the industry is being considered. It would appear that the industry calls for a more complete investigation than has yet been suggested, but this should be the work of a highly trained personnel, rather than be delegated to any organisation representing one particular group or, for that matter, any combination of groups, whose functions could not specifically extend so far.

### **A National Advisory Board.**

It might be suggested, however, that to bring all groups together on a common purpose, a National Live Stock and Meat Industry Board be formed, to include members from live stock associations representing the producers; members from master butchers' associations representing the retailers; members from exporters' associations representing the exporters; and members representing the selling agents; also that State boards be formed to function under the National Board. At first glance, however, it no doubt would be asked: "Whatever in the world have these different groups in common?" which is exactly the attitude of mind responsible, to a large measure, for the position of the industry to-day. They have everything in common. Apparently it is only lack of knowledge of each other's problems that keeps them apart, and the industry in a depressed condition as a whole. In order, therefore, to assist such boards, it might be further suggested that a Commonwealth Live Stock and Meat Industry Advisory Board should be established, with a personnel qualified to study all phases of the industry. The number of consulting members should be restricted to the qualifications required—i.e., live stock production (cattle), live stock production (sheep), producers; general economics of meat industry, plant operations and equipment, industrial management; scientific research, science; industrial relations, labour. The consulting members should be actively engaged and connected with the industry in a capacity which qualifies them to so act on the advisory board, preferably being presided over by a permanent chairman. The consulting members should be approved, and the chairman appointed by, the Commonwealth Government.

### **A Commonwealth Board.**

The function of the Commonwealth Advisory Board should be: To study and advise the Commonwealth Government on all matters appertaining to the industry, from a national standpoint; to advise the State Governments on matters connected with the industry, as affecting the respective States in their relation to the national standpoint; to work with and advise the National and State Boards. The specific matters which the Advisory Board would investigate and study would be as follows:—Live stock production: Commonwealth costs of production, by defined areas; improvement in live stock; character of live stock in relation to demand; regularity of supply; water supply on stock routes. Live stock losses and damage: Ticks; dehorning; branding; bruising. Distribution of live stock: Geographical relationship between human and live stock population; distance from producing to consuming areas; railway organisation and live stock rates; economic methods of distribution. Live stock market operations: Methods of handling, selling, and cost. Grading of live stock: Uniform standards; facilities and service of grading. Inspection: Means of extending ante and post mortem inspection of domestic killing. Research: Develop practical data, and carry on researches into new and scientific problems connected with the industry under the following headings:—Production; marketing; improvement of old and invention of new industrial processes and products; transportation;



and the relative economy composition and nutritive value of the various cuts of meat. Centralised killing: Consider the extension of the system of centralised domestic killing, where and when practicable, and encourage the utilisation of by-products in all killing establishments. Secondary industries: Follow the development of all subsidiary secondary industries. Export: Such a board could study the disabilities of the exporters, and assist them towards a better state of affairs in their branch of the industry. It could possibly be of great assistance to the exporters on such matters as economics in operations, transportations, &c. On the broader questions of Empire development and trade, it would have the necessary knowledge to authoritatively represent the interests of the Commonwealth in respect to the meat industry.

### **Surplus Producing Areas.**

The policy of the board should be to promote the fullest development of the available resources of the country suitable for the production of live stock, particularly investigating the position of Northern Queensland, the Northern Territory, and any other defined areas where cattle production is in a precarious condition. It should consider ways and means of encouraging production in any specific areas, where economic conditions might for the time being be less favourable than in the more thickly populated divisions, where products can be disposed of to better advantage, and where operating expense might be less. For example, after determining the average cost of production in the defined areas, the board might find in one or more the return to the producer is less than cost, and in consequence production is diminishing and the quality of the herd deteriorating. It might be found that, before the industry in such a division or divisions can be restored to a paying basis, an increase in the herd and an improvement in its quality is essential, inasmuch as, through the means of additional volume, the exporter's expense would be reduced, and the improvement in the quality would enhance the value of the products. The producer, however, may not have the resources, nor be in a position to secure the credit, to enable him to effect improvements, the benefits from which would not be immediate, consequently, as time goes on, the position goes from bad to worse. If it is in the interests of the Commonwealth that production in such areas should be maintained, and there should be no doubt on this point, then the advisory board, having thoroughly investigated the position, could bring the matter before the Commonwealth Government, possibly with a recommendation that a reasonable price per 100 lb. delivered weight of the respective export qualities should be guaranteed the producer for a period long enough to enable the improvements to be made. Such a guarantee, however, should be given to producers individually, upon their giving satisfactory evidence to the board that steps will be taken to bring about the necessary improvements in their herds. Anything in the nature of an unqualified subsidy would not be likely to bring about the required change in existing conditions, whereas a guarantee to make possible a desired objective would be more in the nature of a business investment, and would be nationally sound. It could be expected the liability of the Commonwealth would be diminishing throughout the period of the guarantee, and that the benefits derived would be permanent.

### **Future Considerations.**

In course of time all the large cities of the Commonwealth, no doubt, will have large public killing establishments, such as in Sydney and Adelaide. With similar single units in Melbourne and Brisbane to those already existing in Sydney and Adelaide, the average tonnage per unit of these main plants would compare favourably with the average tonnage per unit of the Argentine plants, thus providing an industrial organisation of competitive dimensions that could be availed of for export killing. Other great policy matters may arise in the future, perhaps such questions as direct ownership of these institutions by the people, or the extension of their functions to the point of furnishing the entire service between producer and retailer. These, however, are questions for the future to determine. The immediate suggestion is to grapple with the very adverse condition of the industry as it stands to-day, and through the means of an organisation broad enough to broaden with the future. Australia is destined to expand, and the live stock and meat industry, as a whole, to fulfil its economic functions, must keep pace with such expansion, otherwise fail to pull its weight in the future development of the Commonwealth.

### **Conclusion.**

The intention of this paper is to afford a brief general insight into the existing condition of the live stock and meat industry, and to suggest what might lead to a practical and effective basis of organising it, so that this great industry can

be guided to a state of proficiency. Immense changes bearing on the question of competitive costs are taking place in the world of industry and business to-day. Science and engineering are for ever concentrating in this direction; enlarged volume has become an essential; intelligent and accurate data has become an absolute necessity; positive elimination of waste is being sought; in fact, every old method, process, and product is being challenged in one way or another, and any country that sits idly by, cannot hope to keep its place in the competitive markets of the world to-day. On the other hand, should the industry of this country seriously adopt a progressive attitude, sinking individual interest in favour of organised effort, it can no doubt look for a fair measure of governmental support in the solution of its initial problems, thus enabling it to approach a more secure and prosperous condition for itself, and for the welfare of the country in general.

### THE MEAT INDUSTRY EXHIBIT.

Mr. J. B. Cramsie (chairman of the Metropolitan Meat Industry Board of New South Wales) congratulated Mr. Sunners on his paper. "This is the finest exhibition of its kind I have ever seen," he said. "I was asked if this is a better show than the one we had at Sydney. It is better, undoubtedly, but next year we will have a better show than yours. With the same spirit of harmony and co-operation that exists now, we will make the producers realise the necessity for organising their industry on a thoroughly profitable basis.

### "Make Queensland the Best Mutton-producing State!"

"I have not seen, in my experience of more than thirty years, such high quality sheep as those in the refrigerating chamber. I did not think it was possible to produce such quality outside of New Zealand. They are Corriedales, and they are without compare. My only regret is that they are not produced in greater numbers in the Darling Downs, to make Queensland the best mutton-producing State in the Commonwealth."

### The Beef Exhibits.

Mr. Cramsie said the beef exhibition was an excellent one. It was ridiculous to say that Queensland could not produce early-maturing beef. If breeders would take the cut-outs in the exhibition as their model types they would have nothing to fear from the Argentine. Two years ago he spent eighteen months touring the world in the interests of the Australian meat industry, and he came back convinced that the time was ripe for Australia to go ahead and take her place as one of the best meat-producing countries in the world. He hoped, as a result of the exhibition, that people would realise the necessity for proper organisation of the industry which was so necessary for the development of Australia. "This country was developed originally by cattle men," declared Mr. Cramsie, "and until we have the whole of our country under occupation it will be necessary for the cattle industry to prosper. Our forefathers, who pioneered the producing industry, had plenty of difficulties to overcome, but they overcame them, and we will have to do the same. It is only by organisation that Australia can take her proper place as one of the biggest meat-producing countries of the world, and the country that will remain for all time the supplier to the markets of Great Britain." (Cheers.)

Mr. W. H. Paine (head of the publicity branch of the Metropolitan Meat Industry Board of New South Wales) spoke of the necessity for breeding good cattle to get good by-products. "Good quality cattle means larger income from by-products," he said.

Mr. J. L. Wilson (Calliope) proposed a vote of thanks to the Acting Premier, which was carried with acclamation, and Mr. Smith briefly responded.

### "Super Excellent."

In the course of a subsequent Press interview Mr. Cramsie, referring to the Meat Industry Exhibit, said:—

"This display is super-excellent. After an eighteen months' tour of the world in the interests of the Australian meat industry, I can conscientiously say I have never seen a finer display, and I saw all that was to be seen."

Mr. Cramsie added: "It shows that Queensland can produce a quality of beef equal to that from any other producing country in the world, and let us hope that one result of this display will be that the Queensland producer will be immensely heartened, and will do his share in organising this important industry in its various stages of production, treatment, transport, and marketing, so that the industry can be put on a sound footing, and become a really profitable one, not only for the primary producer but also for all others concerned."



**Australian Secondary Industries.**

Mr. Cramsie was particularly pleased with the display from the point of view of production, treatment, and by-products, right through the secondary industries, and their finalised products, which have been brought back from various countries where they are manufactured at present. "I hope, however," he said, "that these higher grade by-products will be manufactured in Australia in the near future, in furtherance of our new secondary industry policy."

Mr. Cramsie urged every one interested in the meat industry to study the slogans in the pavilion.

The Meat Industry Exhibit, which was one of the finest features of this year's Show, is described in detail in our Special Show Report in this issue.



PLATE 89.—JAMES A. HEADING, D.C.M., M.M.

Mr. Heading, who has been re-elected Chairman of the Queensland Co-operative Bacon Association, Ltd., Murarrie, is on the Board of Directors of the Farmers' Co-operative Distributing Co., Ltd., and also the South Burnett Co-operative Dairying Co., Ltd. He is Chairman of the Murgon Shire Council and President of the Murgon Show Society.

He served during the Great War with the 47th Battalion, A.I.F., and was awarded the Distinguished Conduct Medal and the Military Medal for conspicuous valour in the field.

## PIGS AT THE BRISBANE SHOW.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

The increased interest evidenced throughout Queensland in the production of more and better pigs on every farm, was again emphasised in a striking manner at this year's Royal National Show at Brisbane, at which a splendid entry of good-quality pigs, comprising representatives of all the breeds common in Australia, was penned. The Pig Section at exhibitions of this nature always attracts considerable attention; it draws more than its proportion of the crowd of spectators and is of the greatest educational value. People see the pigs in their Sunday dress, as it were, and are attracted to them in a way hardly possible on the farm, where piggy does not always receive his fair share of attention or comfort. It is educational also in that people from far and near have an opportunity of inspecting representative males and females in the several breeds and of comparing their type and quality with those of other breeds, with which they are, possibly, not altogether conversant. It carries an educational value also in that it shows that, if given reasonable care and attention, and if provided with anything like satisfactory accommodation, pigs can be kept clean and healthy and in an attractive condition. People see the pigs in clean, comfortable, commodious pens, nicely bedded down with clean straw from which no unpleasant odours emanate, nor with which people of any class could find complaint. This is one of the most important features of the Show, for, unfortunately, there is a very erroneous impression abroad that pigs are other than clean, healthy animals. A visit to the pig pens at the Exhibition dispels this idea and creates quite a favourable impression of His Majesty the Hog.

This year, owing to Quarantine Regulations, the showing of pigs was confined solely to Queensland-owned animals from Queensland farms; no interstate porcine stock being admitted to competition. This being so, it was indeed satisfactory to note that the entry was well up to the standard of previous years and the quality quite as good. The number of exhibitors was also well up to that of former shows, the ranks of the absent Southern exhibitors being well filled by new and enthusiastic Queenslanders making their first attempt at exhibiting at a big show like the Royal National. Quite a satisfactory feature of this, too, was the fact that a number of these new exhibitors were folk who have become interested in better pigs per medium of successful Pig Clubs in operation in their respective districts. This is quite as it should be, and indicates the possibilities and advantages of club membership and enthusiasm. Several special classes were provided for Pig Club members and, though the entry was not large, it was complete. As an instance, George and Eileen Davison, Pig Club members from the North Arm School, penned several of their Large Black pigs. George Davison, junior, won a Large Black boar, presented by Captain Calcott, an enthusiastic Victorian breeder, at the North Arm School Pig Club contest last year. After the judging, George's father came to the writer and stated that he had decided, in consultation with his children, to have me select for them a suitable Large Black sow. This was done, and the result has been that the Davison family have since sold quite a number of selected stud boars and sows at from 6 guineas each upwards, and have booked orders for a number more.

Another typical instance was the Tamworth bacon pigs, exhibited by the Alford boys, members of the Pomona Pig Club. These people have become successful breeders of Tamworth pigs; they have three boys as members of the Pig Club and have made numerous sales. The Palmwoods State School Pig Club, represented by the Roy boys, sons of Mr. and Mrs. C. F. A. Roy, of Palmwoods, have also, through winning a Middle Yorkshire sow and through purchasing from another club member a Middle Yorkshire boar, also donated by Mr. Ralph Joyce, a prominent Victorian breeder, of Kyabram, Victoria, now become quite established as breeders of Middle Yorkshires and, at exhibition time, had practically 100 guineas' worth of stud stock on hand. At the stud sales, one of their boars was sold to a resident of New Guinea, another two to farmers at Gayndah and Coalstoun Lakes, another to the Colonial Sugar Refining Company's mill at Maenade, North Queensland, and several to breeders, including the Salvation Army Training Farm for Boys at Riverview, Queensland. They booked orders for other pigs from a litter expected shortly. The Cordwell Brothers, of Kureelipa, members of the Mapleton Pig Club, though not exhibitors at the Exhibition themselves, had some of their pigs entered in the name of their father, Mr. W. Cordwell, of "Allendale," Kureelipa. This gentleman, in discussing the value of this feature of pig raising, admitted freely that their success as breeders of Poland-China pigs was due entirely to Pig Club work; they had some excellent quality stock, won several prizes, sold several sows at 6 guineas each at four months' old, and are on the highway to a successful future. Mr. Cordwell freely assured me that his farm revenue has increased by more than £100



per annum since his boys have taken up this class of work and have introduced better quality stock, for which they have many buyers. One of George Davison's Large Black boars realised 14 guineas at public auction, and it is quite certain that had he offered his stud sow, "Wattle Violet," she would have topped the sales.

The Boonah Rural School had a pair of excellent quality Berkshire boars entered. They won first prize, and were really very attractive animals.

Another new and attractive feature at this year's Exhibition was the Litter Weight Contest, in which one litter of pigs, weighing 1,478 lb., was shown, and another litter just three months old topped the scales at 651 lb. These litters were well worth inspection, the winning litter of Gloucester Old Spots shown by the Kingston Pig Farm Co., were really choice. The second prize litter, owner by Mr. George Setch, of Marburg, of excellent type and quality and well worth seeing, were of the Berkshire-Tamworth cross. The Berkshires shown by the Gatton College sold readily at auction at stud values.

The Bacon Pig Carcase Contest, another new class, created quite a big interest and featured several new and important ideas in regard to the production of bacon



PLATE 90 —G. F. DAVISON'S FIRST PRIZE LARGE BLACK SOW, "WATTLE VIOLET,"  
BRISBANE SHOW, 1927.

The Large Black breed of pig, recently introduced into Queensland, comes with a good reputation for prolificacy, heavy milking capacity, and docility. The breed has a value especially for cross-breeding purposes for bacon pig production, and is a favourite with many farmers. Several of this sow's progeny were entered in the Pig Club Classes, one young boar realising fourteen guineas, at auction, at five months old. This sow's first litter of nine reared were valued by the Instructor in Pig Raising at more than ninety guineas.

pigs. Mr. Percy Campbell, of Lamington, won the first and third prizes in this class with Duroc-Jersey crosses, while the Kingston Pig Farm Co. annexed second with a pen of Gloucester Old Spot-Tamworth crosses. Quite a number of pigs in this competition were over-weight and too fat for best local trade. The class has been productive of a great deal of good.

The pen of Model Bacon Pigs, including Tamworth-Berkshire crosses and a Middle Yorkshire champion from the Nambour Pig Club, and owned by William Lowe, were also well worth inspection. There were three pens of good-quality porkers quite close to the Model Baconers and to the Pig Club classes.

### **The Berkshires.**

The championships in the Berkshire section were won by Mr. H. Franke, of Cawdor, who won with both boar and sow, the reserve in the boar classes going to Goodna Hospital and in the sow classes to Mr. Mat. Porter, of Wondai. The Empire Challenge Cups were thus won by Mr. Franke, who also annexed the ribbons presented by the Australian Stud Pig Breeders' Society. At a later stage Mr. H. Franke won the silver cup presented by Mr. R. G. Watson for the most successful exhibitor in the pig section; Mr. C. W. Krause, of the Marburg district, being a very close runner-up. The Berkshire section invariably attracts a good entry, this breed still retaining pride of place as far as general popularity goes in this State. The entry of young stock particularly was well worthy of notice; admittedly there were no "record-breakers" at the Stud Sales. The general average was, however, well up to the standard of former shows and proved quite a valuable addition to the Stock Sales of the Show.

### **The Yorkshires.**

We have no Large Yorkshires in Queensland yet, so that competition was restricted to the Middle Yorkshire breed. Competition in this section is always more or less limited at Brisbane, though undoubtedly the quality is there. On this occasion there were only two—but two very enthusiastic—exhibitors, both of whose pigs were shown in good breeding condition—not over-fat. The champion boar was the property of Mr. Max Gornik, of the Manly-Wynnum district. In the younger classes Mr. C. F. A. Roy and his Pig Club members from the Palmwoods district were successful, winning both first and second prizes in several classes. The Middle Yorkshire seems to be slowly regaining its former popularity, especially for cross-breeding purposes with the Berkshire.

### **The Tamworths.**

As is usual at the Brisbane Show, Tamworth pigs were well represented, this breed having forged ahead in popular favour in recent years with all classes of the farming community. The exhibits at the Show created quite a favourable impression, particularly the bacon pigs of the Tamworth-Berkshire cross exhibited in the Litter Weight Contest, in the Bacon Pig Carcase Contest, and in the Model Bacon Pig pens.

The Gatton College annexed the championship in the boar classes; they also won the reserve championships, that for sows going to the Dunwich Hospital, Stradbroke Island. There were many fine-quality Tamworth pigs exhibited; particularly fine were many of the young pigs under twelve months old. While such high-quality "Red Pigs" come forward there is not likely to be any slackening in the demand or loss of popularity in the breed.

Yet it cannot be said that the Tamworth breed shows to advantage in the somewhat confined area allotted to this breed at the Show. Tamworths show up to more advantage in a good sweet potato patch or grazing over succulent lucerne paddocks. It is not the nature of the Tamworth pig to be closely confined or continuously penned—he was not developed for that purpose. He gives of his best when allowed range and abundant supplies of bulky foods. It is for this reason that Tamworth sows and litters do not appear so comfortable or so attractive as the Berkshires or the Yorkshires, &c.

### **The Poland-Chinas.**

While the foregoing is certainly true of the modern representatives of the original wild pig of Old England (the Tamworth) it does not apply in the same way to the American breeds, especially the Poland-China for, with their glossy, black coats, sparsely marked with white points, they show their good qualities to considerable advantage.

The exhibitors in this section, too, had spared no effort in vying one with the other to show their stock to the best advantage possible. As it happened, there were about an equal number of new and old-established breeders competing, the former including Mr. C. W. Krause, of Marburg, winner of the championship in the boar classes and other prizes, and Mr. W. Cordwell, of Kureelipa, a successful exhibitor of young stock. Mr. Alan Cooke, of Maleny, was also included, though his entry was confined to one animal only. The Kingston Pig Farm Company could also be classed as a new exhibitor in this section, though they have exhibited in other pig classes at former shows. Of the old-established breeders, Mr. J. H. Whittaker, of Broxburn, on the Darling Downs, and the Queensland Agricultural



College and High School, Gatton (still well and favourably known as the Gatton College), were successful.

Altogether, the Poland-Chinas were very good, though the tendency in this breed is for the animals to be shown almost in an over-fat condition.

### The Duroc-Jerseys.

Both championships in these classes were annexed by Mr. Percy V. Campbell, of "Lawn Hill," Lamington, via Beaudesert. The largest exhibitor and breeder of this type in this State, Mr. Campbell's pigs were shown in ideal condition; his experience with this breed has been such as to create a very favourable impression. A customer of his, Mr. W. Koehler, of Yamsion (a new exhibitor, too), was also a competitor, and scored a proportion of the prizes, his pigs being favourably commented on. The Duroc-Jersey is as yet a new breed in this State, though it has had a three years' run. Breeders of this type are handicapped in their progress by the difficulty of securing fresh and unrelated strains of blood. The breed has proved its capabilities as far as it has been possible for them to do, and the fact that they



PLATE 91.—THE FIRST PRIZE LITTER IN THE LITTER-WEIGHT CONTEST AT BRISBANE SHOW, 1927. SHOWN BY THE KINGSTON PIG FARM CO., KINGSTON.

Pure-bred Gloucester Old Spots, carrying imported blood, of the most up-to-date type. The nine pigs in this litter, exactly three months old on Judging Day, weighed 651 lb., an average of  $72\frac{1}{3}$  lb. These pigs were well developed, were even in size, and were growing rapidly. The Litter-Weight Contest is well worth studying; it is a new class at Agricultural Shows, and must be clearly understood to be appreciated. Details may be obtained on application to the Department of Agriculture and Stock.

came out on top in the Bacon Pig Carcase Contest adds more laurels to their crown. Without doubt, the breed has come to stay, for breeders far and near are interested in these "Red Americans," and seem intent on continuing the experiments.

### The Gloucester Old Spots.

It is not the intention in this article to write up the breeds in their order of merit or in the order in which they are entered for in the Show schedules, nor are the remarks based on the number of entries or successes. Nevertheless, the G.O.S. (as it is most frequently referred to in literature) created a very favourable impression, this year's exhibits being the best that has yet been seen at any show in Australia, though the exhibits at the Melbourne Show always attract considerable attention and are of high quality.



The Kingston Pig Farm Company, of which Mr. R. G. Watson, the well-known auctioneer and the former secretary of the Queensland Branch of the Australian Stud Pig Breeders' Society, is principal, were the only exhibitors, and consequently annexed all the prizes in this section of the Show. Mr. Bert. Whittaker, a graduate of the Young Judges' Competitions and an enthusiastic junior in the pig world and his mate "Bill," were in charge of the Kingston entries and had them in excellent form. This breed continues to make rapid progress and to create a favourable impression among both pork and bacon pig fanciers. It is an Old World breed with a reputation dating back many years and, though among the most recent introductions here, has made headway indicative of future successes and is, therefore, already well established.

Crosses of this type were shown in the Litter Weight Contest, Bacon Pig Carcase Contest, and in the Pork classes.

### Large Blacks.

Though entries in the Large Black classes were confined to the exhibits of Mr. G. F. Davison, of North Arm, and his son George, they were, nevertheless, of good quality and of up-to-date type, the quality of the imported sow "Wattle Violet,"

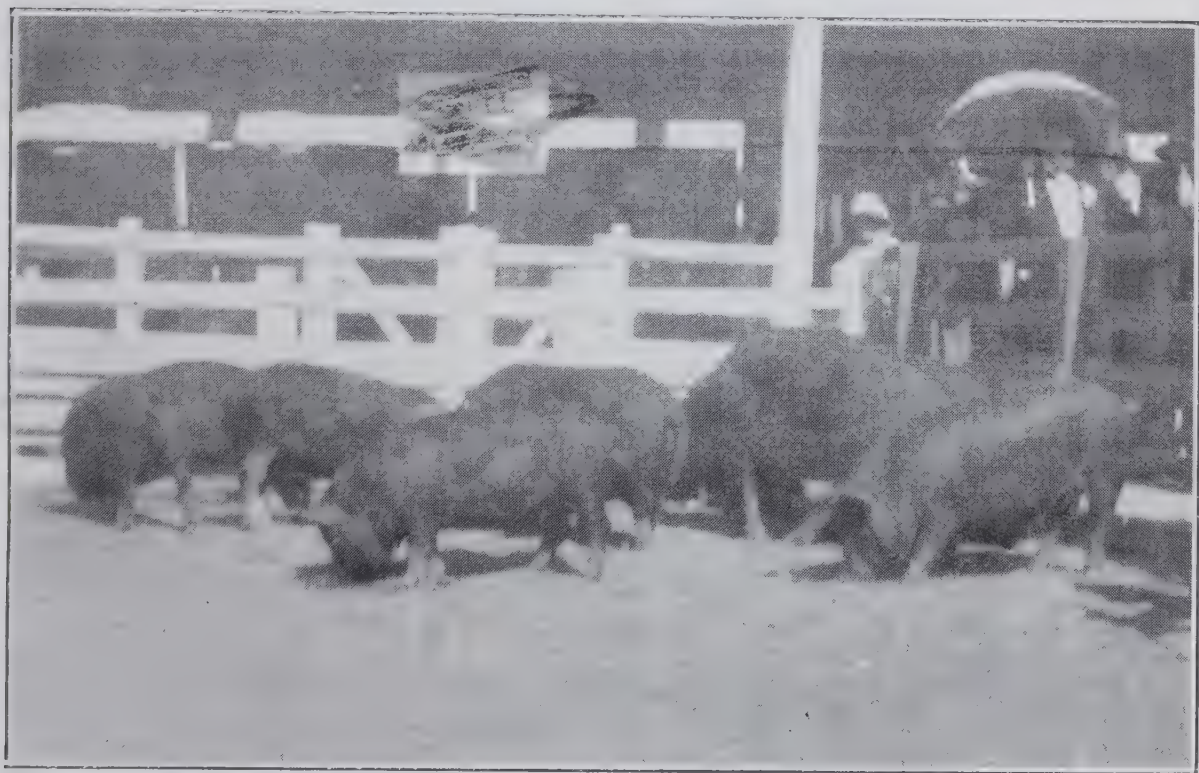


PLATE 92.—THE SECOND PRIZE LITTER IN THE LITTER-WEIGHT CONTEST CLASS AT BRISBANE SHOW. SHOWN BY MR. GEORGE LETCH, OF MARBURG.

The ten pigs in this Litter, at five months and three days old, turned the scales at 1,478 lb. It is probably the heaviest Litter yet exhibited at an Australian show. The sire, a pure bred Berkshire, the dam a crossbred Berkshire-Tamworth sow. There were fourteen pigs in the Litter, of which ten were reared. Average weight per pig, 147.8 lb., at five months three days old.

comparing more than favourably with illustrations of stock exhibited at the Royal Agricultural Shows of England and other countries.

This is a breed with an excellent reputation, many farmers having a great fancy for the long, roomy, deep-bodied, heavy-milking sows for cross-breeding purposes.

In general outline and type there is not a world of difference between the Gloucester Old Spot and the Large Black; in fact, they are both original types from Old British stock, the former coming from Gloucestershire, the latter from Devon and Cornwall, and both now well distributed throughout the world. At any rate, if Large Blacks of equal quality and of similar type can be produced continuously in the North, the demand will follow and the breed will regain its early popularity.



### Display of Pork and Bacon Products in the Live Stock and Meat Industry Hall.

Reference to this section of the Show activities would not be complete without reference to the display of Fresh Pork and of Pork Products in the new Live Stock and Meat Industry Hall (see Plate 86) in which, in addition to the general display of manufactured products as shown, the display of fresh pork and pork delicacies and bacon pig carcasses was included, the latter in the specially constructed glass refrigerating chambers occupying the whole of one end of the hall.

The attractive and instructive fresh pork display, tastefully prepared and arranged under the guidance of Mr. Brunckhurst, manager of the State Butcheries, was a show in itself and drew the attention of thousands of spectators as they moved around this hall of wonder—a special feature of the Exhibition. The display of beef and mutton and of the various products resulting therefrom, together with the trade displays, were a sight long to be remembered, and it is satisfactory to note that just as favourable comment was passed on the Pork and Pork Products display as on any other section of those staged.

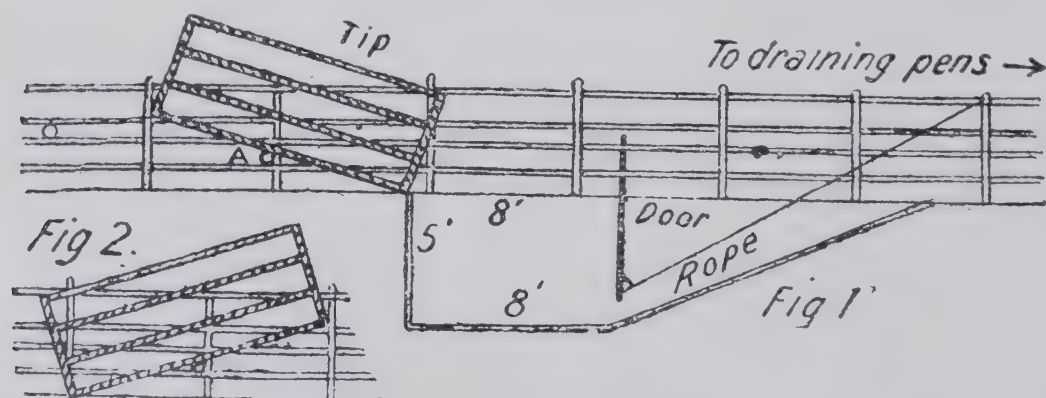
The Pork Products display featured not only the usual manufactured products—bacon, hams, and lard—but all manner of lines from the salted intestines used for sausage casings, the blood used as stock food and as a fertilizer, the various internal organs and the products manufactured therefrom, right down to the gall from the liver, which product is not wasted, it being used in the printing trade as a special necessity. Hoofs and glue pieces used specially in the manufacture of glue; lard oil manufactured from lard; hair used in upholstering work, &c.; the skin of the pig used as leather for permanent durable covers for specially prepared saddles, suit-cases, pocket wallets, purses, &c.; canned goods, including every variety of sausage, saveloys, Camp Pie, Rex Pye, pork brawn, pork and beans, and minor sandwich lines, ham pates, &c., Devon sausage, Strasburg sausage, ham delight, black and white puddings, brawn, bloodwurst, liverwurst, &c. Lard was shown packed in cans for export and in bladders and 1 lb. pats for local trade, while in addition to sides, flitches, shoulders and hams, rolled bacon, a special delicacy, was shown.

The display comprised a most attractive collection of Pork Products and drew admiring crowds throughout the Show.

In the Court of the Department of Agriculture and Stock a special display of Pork Products was also tastefully arranged and was much admired. Altogether, the Pig, Pork, and Bacon sections added considerable interest and value to the national display of Queensland's primary and industrial products.

### DIPPING DEVICE.

At the request of a Tasmanian correspondent, a tip device for dipping sheep is reproduced:—When small sheep dips are used, it is necessary to do a certain amount of lifting, and when big wethers are being handled this is a heavy piece of work. Mr. J. S. Mortimer, of Katunga, to obviate this handling, employs a tip as shown in the illustration. The tip is balanced on a piece of iron piping, which rests on the rails of the fence, the piping being nearer the entrance end. When the sheep are entering the tip, the end nearer the dip is sustained by a rail underneath it and



resting on two fence rails, as in Fig. 2. When the cross rail is withdrawn, the tip falls down, sliding the sheep into the dip. Mr. Mortimer's dip is 20 feet long by 2 feet wide at the top, 8 feet long by 1 foot wide at the bottom, and 5 feet deep, built of bricks in cement. He places great value on the swing door, by means of which sheep are kept in the liquid for about a minute, after which the door is lifted by the rope tied to the top rail of the fence.—'Australasian.'

**COTTON-GROWING IN 1860.**

Mr. J. W. Willis-Jenyns, of Main street, Kangaroo Point, forwards the following interesting note, together with a photograph of two highly-esteemed pioneers, Mr. and Mrs. E. E. Caswell, who represent the finest type of early Queensland settler, and to whom the State, built largely on the grit and enterprise of our first farmers, is greatly indebted.

In the early sixties of last century cotton-growing was a subject of keen interest to Queensland farmers. Mr. Pratten, of Eight-mile Plains, grew a paddock of Sea Island cotton. The Governor (Sir Geo. Bowen), Lady Bowen, and party rode out on



PLATE 93.—QUEENSLAND PIONEERS—MR. AND MRS. E. E. CASWELL,  
OF "COBURN," WANGALPONG.

horseback to see the new venture. He commended the grower on the very fine crops, the bolls being exceptionally well formed, showing a long silky staple. A contest had been arranged, Miss Wright, who was living with Mrs. Pratten, proving the winner, and though only twelve years of age, she picked 120 lb. of clean cotton, receiving the congratulations of the Governor and others present for her skill and endurance. She became known as the champion cotton-picker. Mrs. E. E. Caswell (née Wright) is still active at the advanced age of seventy-nine years, and with her husband, who is ninety years of age, is living at Coburn, Wangalpong, where they are held in very high esteem. They have a family of twelve children (all living), and many grandchildren.

If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.



## SHEEP ON THE ATHERTON TABLELANDS. PROBLEMS DISCUSSED.

### WHAT TO DO—AND AVOID. A TALK TO FARMERS.

By MR. W. G. BROWN, Sheep and Wool Expert, Department of Agriculture.

It is nearly three years since I visited the Tableland, and after three weeks' close inspection, lectures at various centres on the possibilities of sheep culture, especially on the lines of production of fat lambs and sheep, I found, of course, that there were drawbacks, but allowing for these, I came to the conclusion that there is no part of Queensland with better natural advantages for the business than the Evelyn and Atherton Tableland.

I have had no opportunity since then, until recently, to revisit the country and see what was being done. I have just returned after a three weeks' inspection of conditions. The weather was very unpropitious, it having rained for the whole time. Thus I was prevented, owing to the state of the roads, from making as thorough an inspection as I would have liked; yet I saw sufficient to make a clear and definite statement that I see no reason at all to change my first opinion.

At the invitation of Mr. W. A. Whiting, President of the Atherton Local Producers' Association, I delivered an address on "Sheep on the Tablelands" to a very good audience of farmers at Atherton on the 15th July. Below I submit the gist of what I said.

#### **Worms and Footrot.**

Before I went out on this trip I heard most alarming reports of damage done by the stomach worm and footrot; all the sheep poor and dying, &c. Now I have no doubt that stomach worms are present, but in only one case out of many I investigated did I find them seriously damaging the flock. In every holding I killed a sheep and found them quite free of stomach worms. Yet a great many of the animals were poor, miserable, and dying. I saw, also, very many poor, miserable poddy lambs, and the mortality was appalling. I saw, also, many lame sheep. On the other hand, I saw sheep, lambs, and weaners thriving as well as any sheep I know of in the same flocks as the unthrifty animals. Paradoxical, until investigation was made.

#### **The Wrong Sheep.**

In every lecture, pamphlet, or radio address I have stated definitely for years, and clearly, that Merino sheep never were nor will ever be suitable sheep for coastal areas on the Northern Tablelands.

What do I find on this visit to the Tableland? I find that thousands of Merino ewes and wethers have been bought, which have been starving in the West for many months, put on the trucks at Hughenden and other centres, arriving on the Tableland with from 10 to 20 per cent. dead in the trucks, with further losses after being put on the farms. I found that, in most cases, the sheep were old, many of them broken-mouthed and "gummy." They had left very dry western country to arrive into months of rain, and grass which is never dry. Merino sheep, even when young and strong, hate going into wet grass. If they are continually on wet pasture they suffer from foot and other troubles. Naturally those who were considering sheep turned away from the proposition. Wherever I found crossbreds, they were thriving, because by their ancestry they were suitable sheep for the moist conditions. I am entitled to feel very sore when, after all my warnings, my teaching is either despised or forgotten, which is the same thing.

#### **Soil Deficiencies.**

Besides the unsuitability of the Merino as a fat sheep proposition, even in dry weather conditions on the Tableland, there is another, and, I believe, very important question to be answered.

The chief crop in Queensland is grass. The greatest production of the State, and of Australia, for that matter, is given by the pastoral business; 34 per cent. of the income tax, for instance, is paid by pastoralists.

It is well known that phosphoric acid and lime are the most important elements which enter into the production of beef, wool, mutton, butter, milk, &c. It is also known that the soils of this State, even on virgin country, are well supplied with these. Yet year after year for many decades past these essential minerals have been taken from the pastures, which take them from the soil—when they are there—and sent abroad in the various commodities produced from the land, and nothing has been or is being returned. The soil is starved, the grass is starved, and, as a

consequence, the animals are starved. It is quite safe to say that the herbage is not half as nutritious as it was, say, thirty years ago. This applies particularly to the Tableland. The animals I saw on the Tableland are starving in the midst of what seems to be plenty, but isn't. The soil of the Tableland is rich, deep, and very porous. It is in consequence of this porosity that whatever amount of soluble lime and phosphoric acid be in the soil under dry conditions, they are leached down into depths where the roots of the grasses cannot reach them.

### Lambing—The Wrong Time.

In winter time, too, most grasses are at their lowest in nutritive qualities, yet the Tableland sheep farmers have seen fit to time their lambing now, when the phosphates and lime, &c., are low, and the nutrition in the grass is at its lowest. No wonder the ewes are weaning their progeny prematurely. August or September are proper months here. This part of the subject could be extended to much greater length, but space does not permit. Enough has been said, I think, to point out the cause of malnutrition of the sheep I saw.

### Case for the Crossbred.

Of course, it will be said that what applies to the Merino should also apply to the crossbreds. That is true, but not to nearly the same extent as in the case of Merinos. Crossbreds eat plentifully of bushes and leaves of trees, &c., which have deeper roots than grasses, and so obtain more of the soluble elements of the soil. They are, besides, more voracious eaters and not nearly as dainty as Merinos. They are, too, owing to their ancestry, accustomed to rain, snow, and wet soils. They have also far harder feet, and so do not suffer from foot troubles.

The Romney Marsh is an ideal sheep for the district, with the Border Leicester a good second. I cannot say yet whether the Corriedale will stand up to the Tableland conditions. I believe they will.

### Ills—And Remedies.

It would be idle to advocate the keeping of sheep on the Tableland if remedies for such ills as are to be found cannot be given, if efficacious and reasonably cheap.

As a remedy for the lack of phosphoric acid and lime, a little should be given. Salt, 60 lb.; finely ground Nauru phosphates, 40 lb.; well mixed. Nauru phosphates contain 40 per cent. phosphoric acid and 28 per cent. lime. The sheep should also be given in the winter and spring months from 3 to 4 oz. of whole maize per day per head. This may be broadcasted on a bare place, and the animals will pick up every grain. This is a much better method than putting the maize in troughs. With the troughs the strong sheep can shoulder away the weak one and get an undue share of the rations.

The drench for worms seems to be well known wherever I have been. There is none better than the departmental drench. For other details in sheep management I would refer the farmer to "The Farmer's Sheep in Queensland and Stock Foods." These may be obtained, free, from the Department of Agriculture and Stock, on application.

### How to Stock.

The trouble that has arisen caused by buying sheep without inspection or knowledge is an important factor in stocking the Tableland. It is far easier to buy 1,000 sheep than 50—the number I advise beginners to take on. Crossbreds should be acquired, as thereby three years are saved in the production of fat lambs. I am indebted to Mr. C. Harding, Atherton, for a very good suggestion in respect of that matter. His idea was that a group of, say, twenty men should club their money together and hire a thoroughly qualified man to purchase suitable sheep. As I said above, fifty sheep and one ram is quite enough to start on. It would be a trifling sum if each shared the expense of such a man. If each inspected on his own, the expenses would be prohibitive even if each were experienced. If such a group were formed I know a dozen good men in Brisbane who would take it on, at a reasonable charge.

Another important question is, "What number of sheep per acre should the Tableland farmer run on average *paspalum* country?" This is difficult to answer without inspection. I think five ewes per acre, if they are treated properly, are not too many on most of the country I have seen. I met one man who is running 400 sheep on 30 acres. He will not be running them long. This is an extreme case. When the farmer has had sheep for a couple of years he should have a good idea. An approximate estimate can be given by stating that one head of cattle is equal to about six sheep. The returns are £1 sterling per ewe per annum in lamb and wool, if the animals be properly cared for. This is conservative.



### Mixed Farming.

I have run up near to limits of space for the present. I shall return to it later on other points of discussion.

I regret that such advice in regard to the Merino has not been taken, but I hope that this present advice on the top of the farmers' troubles will not fall on barren ground. The farmers can be assured of this—high-priced farming land cannot be profitably used without sheep. They must come to the Tableland sooner or later; I hope it will be soon. There is an empty market from Rockhampton north, which cannot be supplied adequately for years. When it is supplied then the whole world will be open for mutton, lamb, and wool. I may not see this, but it will certainly come, because it must if farming is to be profitable. "Mixed farming" with sheep as a factor should be the slogan.

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## THE FOREST ESTATE.

By E. H. F. SWAIN, Chairman, Forestry Board.\*

I am asked to try and interest you for forty minutes in matters pertaining to the management of the Forest Estate or otherwise in Forestry, which is an industry devoted to the production and handling of the principal raw materials later to be used in the manufacture of such things as houses and buildings, tables and chairs, bedsteads and wardrobes, pianos and organs, fiddles and fifes, pens and pencils, ink and paper, artificial silks and wools, celluloid and tortoise-shell combs, toothpicks and matches, billiards and beerfroth, quinine and eucalyptus, charcoal and creosote, corn-cures and vinegar, guncotton and chloroform, collars and studs, dolls and playballs, formalin and methylated spirits, rope and bootlaces, suitcases and linoleum, leather soling and babies' dummies, corks and erasers, dyes and gums, cascara sagrada and rubra gummi, perfumes and explosives, railways and tramways, steamships and aeroplanes, cricket and golf kits, and all the other unobviously tree-born things that fill up the workaday world of to-day.

### Forestry a Prime Industrial Factor.

Forestry in short and in fact is a primary producer of raw products which feed a multiplied and increasing array of other dependent industries. It is an unobvious industry because its forest factories are hidden in the bush behind the scenes of Government, as enterprises of State, and because its products and derivatives are either as obvious as air and water and other gifts of Nature or as unobvious as they can possibly be made by an utter unresemblance to their parents.,

Nevertheless, the operations and activities that are a-doing on or about the Forest Estate more than casually concern the citizen and affect even the business and doings of Real Estate, since they provide much of the wherewithal with which the business of Real Estate is conducted—to wit, the houses and buildings aforesaid, with their furnishings and panellings in Silkwood and Silky Oak and Walnut Bean, their shade trees and avenued frontages, and the very water supply which has been conserved for them by the State Forests of the mountain watersheds and conveyed to them in pipes mined with the aid of wooden props.

From the very beginning man has made his home in or of the forest.

"When the Great Architect conceived the plan,  
To build a habitation fit for man,  
Earth was not counted perfect from His hand,  
Till streams and forests gladdened all the land.

"Great forests like huge temples builded high,  
With frondent columns reaching towards the sky,  
Firm founded in the rich maturing ground,  
Their roofs with Nature's glorious verdure crowned."

But man is clever and delights to create his own heaven and earth, to paint the lily, and generally to reduce to his own ideals of economic tidiness the apparently disordered opulence of untidy Nature. Nor has he remained long content with the forest for a home. The impulse to a higher standard of living, to social betterment, to systemised hours of labour and to a systemised life seized him early in his leafy habitation of earth, and he shortly commenced to cut down the living wood of his original home as a savage or sylvager, in order to replace it with the storied

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\*In a recent address before the Real Estate Institute.

wooden caves of the latter-day citydoms in which men do now congregate all the world over to the greater glory of Real Estate and the greater business of the gentlemen engaged therein.

### Ante-Adamite Industry.

Man has been busy since Adam in shaving every vestige of timberland from the smiling face of earth. Within a century he will have got through the job. A hundred years from now the commercial wildwoods of the sphere will have been mopped up, and man will have settled down to his new enthusiasm of showing Nature how to farm forests, as he has shown her already how to handle corn crops of 40 bushels to the acre or more.

We get into a habit of so deploring the disappearance of the past that we perceive not the glories of the future; but the future is as inevitable as the past, and nothing can stay mankind's haste towards a man-made world, a new creation in man's image. The mysterious tangle of the natural wildwood, the forest primeval, will vanish, and in succession will come the regimented tree plantations of the State forests of the next generation, organised wood farms capable of producing a crop of 60,000 feet per acre instead of Nature's 6,000—in sixty years instead of 600—located at the point of maximum economy to the great centres of population and planned on so large and systemised a scale that a magnified logging and sawmilling operation will cut the costs of timber to the heart, and convert to varied use as derivatives the final speck of sawdust, the final head of gum, in factories stationed in the forests almost a whistle reach from the city's edge.

“Great forests like huge temples builded high” can be planned, organised, systemised, sixty years ahead, and made to yield a continuous and never-ending factory production of wooden things in very much the same way as Ford factories and sausage machines turn out Ford cars and sausages.

But the movements afoot on the Forest Estate will yet remain ever indiscernible to the public who gaze above the forest fence, because a billion Ford cars can be placed upon the road before an acre of Hoop Pine can be grown into chairs and tables.

### Time the Essence of the Contract.

Time is the essence of the forest contract, and foresters, suffering the labour of creation, seldom live to enjoy the harvest time. For this reason the practice of forestry is unattended by realisable individual triumphs, and for the same reason is generally avoided by private enterprise as an investment. Thus Forestry becomes State enterprise, although by its very nature, its call for individual initiative, for courage under stress of problem and difficulty, for patience and persistence on the time aspect, it is an intensely individualistic undertaking. Thus upon Government, which becomes heir to the possession of the original wild forest lands, with the immediate responsibility for efficient marketing of the original timber stands, falls the final inevitable responsibility for management and recreation of the Forest Estate. Hence you have a Forest Department which surveys the forests, logs, and sells the product, runs State sawmills, takes timber supply contracts, and plans the organised Forest Estate of the future on lines and to an extent calculated to meet the ordinary necessities of your children's children years ahead. In these days, the per capita consumption of wood, per man, woman, and child of the Queensland population, is 100 feet of sawn softwood and 80 feet of sawn hardwood per annum, or, in all, in this year of grace, for a population of 811,200, 146,000,000 feet of sawn timber. But this population is increasing, as did that of the United States of America at our stage of development, at the rate of  $2\frac{1}{4}$  per cent. per annum, so that before the new forest crops are matured in the year 1986, and thereafter there will be in Queensland 3,000,000 people, whose need in timber will be 500,000,000 odd super. feet per annum—three to four times as much as our forest resources of to-day are capable of supplying. In Brisbane alone there will be a population of nearly 1,000,000 souls, and this new and greater Brisbane will use more wood than the whole of Queensland absorbs this year.

### Bigger Business in Timber.

All this means bigger business in timber, not a lesser business as argue those people who are advocating conversion of the State forests into private agricultural farms, and simultaneously enjoining a firm and hopeful reliance upon expected miracles of substitution of timber in the future by substitutes manufactured from some other and unknown base. It implies also considered timber farming activity by the State upon a scale sufficient to meet figured out requirements. In



Queensland this involves a softwood plantation scheme of from 5,000 acres a year, and a hardwood regeneration scheme of from 15,000 acres a year, representing a yearly investment of capital amounting to from £100,000. Latterly, private enterprise has entered the Australasian forestry arena as a competitor with State enterprise, following upon the discovery that *Pinus insignis* can be grown to cutting size in Australasia in twenty years instead of 120, as in the case of pines in Europe. The more rapid growth of forests in the Antipodes certainly brings forest management within reach of private enterprise, but State Forestry still holds advantage over private practice in that it already owns the most valuable natural forest lands, can borrow funds at less per cent., saves canvassing, brokerage, and other private company costs, and given equal powers of management under Government as under a private directorate, can hope to produce timber at a price to undersell private production. It is also concerned for the State as a whole, and will not wilfully overproduce. In New Zealand, some twenty odd forestry companies are in operation, and if their prospectus figures were realisable their aggregate production would cover the Pacific Ocean with a hundred times more *Pinus insignis* than could possibly be absorbed. Fortunately, however, their prospectus figures are impossible of realisation, nor does the world want a monotonous timber ration of *Pinus insignis* only. In the Queensland climate *Pinus insignis* becomes negligible as a constituent of the forest farms of the future, and other species must be availed of which are adapted to the semi-tropical environment. Queensland will grow Kauri and Hoop and Cypress Pine and Silky Oak and Maple and a variety of other distinctive species of wood for many and varied purposes, and whilst New Zealand may become purveyor in excelsis of *Pinus insignis* to the world, Queensland will become the producer of a rich range of more valuable woods, and as such become the supplier-in-chief of the Australian market for fancy woods.

### Private Forestry Efforts.

Private forestry has much to learn before it can stand firmly upon its feet as a standard private investment. In California, in 1900 to 1910, there was a boom in Eucalyptus planting similar to the present Australasian boom in *Pinus insignis* planting. Some 50,000 acres of Eucalyptus plantations were established by forestry companies operating on the acre share basis. At this date, the best use to which the product has been put is firewood, and half the planted areas are now discovered to have been so uneconomically located with respect to their markets, that half of them are unworkable even for the sale of firewood.

Strange to say California borrowed Eucalyptus planting from us and gave us in return *Pinus insignis*, which in California is not seriously regarded as a timber tree, although in Australia it promises to become one of the most important ingredients of our softwood schemes.

### Queensland's Wealth in Wood.

The Forest Estate of Queensland consists of 4,000,000 odd acres of State forest or other forest reservation, on which grow 400 odd different kinds of woody trees, of which around forty odd are known upon the wood market of to-day. One of the functions of a Forest Department is to know the whole 400 of its wooden ingredients, both as articles of commerce and as living things in the forest combination, in order, on the one hand, to prescribe their proper use in industry, and, on the other, their due arrangement in the artificial timber stands which the future contemplates. With regard to the first the Queensland Forest Service undertakes to identify for the industrial world any of these 400 woods of Queensland, and to prescribe suitable ones in replacement of the imported article. With regard to the second there are certain risks in silviculture which in agriculture can be met as they arise by alterations in the annual crops, but to which, in Forestry, we commit ourselves at planting time irrevocably until harvest time. Vegetation which to outward appearance is economically useless and to be cast aside may be requisite to salt an otherwise too artificialised a forest. Nature maintains an equilibrium by an apparent disregard of economy. Man may undermine Nature on top of himself by too great a regard for economy. The German foresters did this in training the primeval beech and oak forests to become pure spruce, only to discover that spruce prosperity was impermanent and involved insect infestation and butt rot. Hence the foresters' search for maximum production must be tempered by a delicate respect for Nature's judgment. In the long run, Nature knows quite a lot more than we give her credit for.

As you know, the Queensland climate is characterised by pelting summer downfalls and drawn-out winter droughts, during which the upper soils are sucked of their moisture by a prevailing high aridity. This state of affairs produces quite

a different vegetative response to that of Europe, where the earth is thoroughly soaked by the cold rains of winter, and summer arrives merely to add warmth to an otherwise fecund soil. The moisture remains near the surface, the trees root shallowly, and moss and undergrowth crowd the floor, so that evaporation is retarded and the water is held by the forest as by a sponge. Contrast the Queensland position where the seeds fall upon the earth in a summer swelter between rain and shine, with only two or three months to dig in against the oncoming droughts of winter, when the upper soils are parched. Hence you have in Queensland not the shallow-rooted trees of Europe, but "dinkum" diggers which send down a tap root each into the subsoil without taking a breath, and thus duly entrench themselves against Nature. This means that only deep rooters survive and the moss and undergrowth of the soil surface are missing except in the catchment hollows where moisture congregates, and saturating the earth has an immense response under our tropical skies in the high jungles which are known to Queenslanders by the affectionate diminutive of "scrubs."

These factors decide for Queensland the type and arrangement of its forests. The softwood jungles fill the alluvial bottoms of the 30-100-inch rainfall belt fringing the long stretch of coast. They are essentially and naturally of patchy distribution standing out as softwood islands in the sea of Eucalyptian and Leguminous hardwood which alone survive on the evaporated hills and plains encompassing them.

Betwixt and between the typical open hardwood forests of Queensland and the dripping jungles where congregate the Silkwoods, the Rose Mahoganies, the Beans and the Silky Oaks, is the great hillside type of the south-eastern quarter of Queensland, the Hoop and Bunya Pine forest, which, ousted from the heavy jungle by the oppression of the full-blooded, heavy, drink-drenched jungle fancywoods, pits itself against the Eucalyptus trees of the scrub edges, battling against their shade, and gradually creeping through their canopy, eventually spreads its young shoulders above the old Ironbarks, and condemns them in turn to gradual decline and death, save when the bush fires descend upon both, and scorching the Hoop and Bunya Pines to the bone leave a borer host behind to finish them off, whilst the old Eucalypts in their greater hardihood defy both flame and worm, and put forth new green leaves, giving challenge for the thousandth time to all the forces of Nature arrayed against them.

### On the Forest Front.

This then is the situation from the forest front of Queensland, where the tide of battle of Nature ebbs and flows continually and continuously. Man comes in to settle the fight to his own advantage only to discover that the taproot which the native tree develops against Nature is developed also against him, because it makes it extremely difficult for him to use it as a nursery and plantation ingredient. It refuses to lend itself to planting. Not so the docile treeing of Europe, with its shallow fibrous roots which become more shallow and fibrous under nursery treatment, and make the tree amenable to the forester in the new forest. But man is not to be beaten by a tree, and thus has evolved the Queensland equipment for transcending the taprooting difficulty by encasing the stubborn taproot in a planting cartridge.

Thus the Australian trees are being torpedoed into the forest fight of the future in a twist of tin costing a penny, which can be used over and over again. But that penny's worth took seven years to think out, and the extra-tropical world hasn't thought it out yet.

### Overhauling the Deficit.

Hoop and Bunya Pines are our most important trees, providing as they do the main wherewithal for the building of homes for the greater part of our people. But the Hoop and Bunya pine forests occupy only a small quarter of South-eastern Queensland, and are almost indiscernible upon the Queensland map expanse as scattered green specks and smudges. In all they aggregate 1,000,000 acres, and there is left upon them around 1,000,000,000 feet of pine, which we are using up at present at the rate of 60,000,000 feet a year; a sixteen-year resource which, by dint of rationing and dilution, we propose to make serve for up to thirty years, when our first crops of quick-grown species are ripening to the market. Thereafter the local deficit in timber will gradually be overhauled by our plantation programme, which is worked out to provide a constant and normal wood ration for every child to be born or brought to Queensland.

Thus with the help of the unnoticed forest, the homes and businesses of Queensland will prosper, and a larger avenue of activity and service will be opened to the Real Estate Institute of the times to come.



## AUSTRALIAN TOBACCO INVESTIGATION.

In August of last year the representative of the British-Australasian Tobacco Company, when giving evidence before the Tariff Board, made an offer on behalf of the company to enter into a definite arrangement with any State Government, or the Federal Government, to spend £1 for £1 up to a total of £50,000 in developing the tobacco-growing industry in Australia.

The Development and Migration Commission and the Council for Scientific and Industrial Research subsequently discussed this offer with the company, with the result that a definite proposal was submitted by the company which even exceeded the terms of its first offer.

The proposal is that over a first period of three years the company will find £20,000 rateably with the sum of £10,000 to be found by the Commonwealth and/or State Governments for the purpose of carrying out investigations and field experiments. Of the £10,000 the Commonwealth Government has agreed to provide £5,000, and it has been suggested that the other £5,000 be found by the Governments of the five mainland States—that is, £1,000 by each of the States for the three-year period.

If, at the expiration of the three-year period, developments are sufficiently encouraging to warrant further effort, and additional expenditure is considered necessary and desirable, the company will provide a further £30,000 conditionally upon the Commonwealth and/or State Governments providing a similar amount, and it is proposed that the five States referred to should contribute £15,000 jointly, or £3,000 each, to cover this second period, and the Commonwealth Government the remaining £15,000.

The Commonwealth Government and all the mainland State Governments have formally agreed to the proposals on the terms outlined.

Under the terms of the agreement, an Executive Committee to control the policy and general direction of this investigation was constituted, and it was agreed that the contributing States should nominate, say, the Directors of Agriculture, or such other officers deemed suitable, to act as an Advisory Committee.

It was a condition of the agreement that the Executive Committee should consist of a representative of the Development and Migration Commission, a representative of the Executive of the Council for Scientific and Industrial Research, and a third member to be jointly appointed by these two bodies.

The Executive now consists of Mr. H. W. Gepp, Chairman of the Development and Migration Commission; Dr. A. C. D. Rivett, Chief Executive Officer of the Council for Scientific and Industrial Research; and Dr. Darnell-Smith, Director of the Botanic Gardens, Sydney, who has had considerable experience on the scientific investigational side of the tobacco industry in Australia. The Executive has also appointed as an additional full member of the Executive the Chairman of the Standing Committee on Agriculture of the Council for Scientific and Industrial Research, who at the present time is Dr. S. S. Cameron, Director of the Victorian Department of Agriculture. It may be mentioned that all the State Departments of Agriculture are represented on this Standing Committee by their permanent heads.

The organisation of the investigation is proceeding as rapidly as possible, and already much work has been done. An economic survey of the present state of the industry is at present being made, and the results of past experiments and experiences in the industry are being closely studied.

The party conducting this survey will visit the various States and interrogate growers; the purpose of the survey, however, is merely to collect information and not to impart advice. The personnel of this party consists of a man from New South Wales and one from Victoria, together with a graduate in agriculture to undertake a general examination of soils.

It is hoped that as a result of the survey much valuable information will be obtained regarding the economic factors of the industry. A study will also be made of the varieties of leaf grown, and those which have proved most profitable, and information will be sought as to the climatic conditions best suited for their production. The nature of the damage, and the extent of the loss resulting from the ravages of blue mould and the methods employed for its prevention, will also be one of the aims of the survey. Information regarding insect pests and the nature of the damage resulting therefrom, and details of the methods employed in the curing, grading, packing, and marketing of the tobacco will also be sought, and the opportunity will be taken during the survey to invite the growers to offer suggestions for the improvement of the industry. The information obtained as a result of this survey—so far as it concerns the individual—will be treated as strictly confidential.

In addition to this economic survey of the industry in Australia, Dr. Darnell-Smith, a member of the Executive, is at present in America studying the tobacco industry in that country. His inquiries will have particular reference to the question of soils and cultural methods.

Applications are being called in Australia and throughout the world for the position of Director of Tobacco Investigations. Applicants should have had a thorough University training (or its equivalent) in plant physiology and pathology, with special experience, in some aspects at least, of tobacco growing and curing. It is not expected that any applicant will possess expert knowledge of every phase of the industry; hence the selection of a supporting staff will be deferred until the Director has been appointed. The salary offered is from £1,500 to £2,000 per annum (with travelling expenses), according to qualifications. The period of appointment will be three years, and the term may be extended.

It would appear, however, judging from letters received by the Executive from growers and from certain published statements, that there is an impression that the purpose of the funds made available under the agreement is to provide some form of subsidy or financial assistance to the industry. The Executive wish it to be clearly understood that such is not the case, and that the purpose of the Australian Tobacco Investigation, as its name implies, is to investigate the problems of the industry with a view to their solution, and so to establish the industry in Australia on a sound and stable basis.

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It would appear that the first announcement of the agreement gave a decided fillip to the industry, and many inquiries have been received about the possibility of growing tobacco. It is the considered opinion of the Executive that, until the proper methods and conditions have been determined, an increase of the area at present devoted to tobacco is inadvisable. A rapid expansion of the industry at present would probably lead to much unsuitable land being devoted to tobacco culture, and to the production of much inferior leaf. Those desirous of obtaining information regarding the industry are advised to communicate with their State Department of Agriculture, who will be kept informed of the Executive's researches, and who, in the future as in the past, will continue to be the medium for imparting practical advice to growers.

The Executive is anxious that growers will heartily co-operate with it in the inquiries which it will undertake with a view to improving the conditions of the industry. At the same time, the Executive will take the obviously practical course of consulting, wherever possible and desirable, the various bodies connected with the industry, and already arrangements have been made to take full advantage of the advice and help which existing State tobacco experts, in view of their long experience, are so qualified to give.

The Executive is anxious that the investigation shall be carried out with that unanimity and good will on the part of all concerned which characterised the discussions of the contracting parties to the agreement prior to its final acceptance.

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## FACTS ABOUT FOOD VALUES.

M. A. WYLIE, Inspectress and Organiser, Domestic Science,  
Education Department, Western Australia.\*

The classification of foodstuffs was given in a previous issue of this magazine, and in the present article I would remind the reader of the oft-mentioned five groups of foodstuffs, viz., proteins, carbohydrates, hydrocarbons, minerals, and other substances sometimes called nutrients or vitamins. Foods from each of these groups help to make meals well balanced and appetising.

Summarising, we may say the work of food is—

- (a) To build new tissues and repair old ones;
- (b) To furnish heat and energy for work and play;
- (c) To regulate the machinery of the body in order to ensure normal growth and health.

The proteins, such as albumens (found in meat, milk, and eggs), are the builders and repairers of tissue. The carbohydrates, such as starchy material and sugars (found in grains and fruits), supply material for the production of energy, whilst hydrocarbons (fats) give warmth, and, under certain conditions, energy. The minerals, such as iron, calcium, and phosphorus, obtained from the outer coats of grains, also from vegetables and fruits, are required for teeth, bones, blood, and

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\* In the "Journal of Agriculture," W.A., for June.



tissue generally. Vitamines have a large share in keeping up the normal growth and health of the body.

The material called roughage also plays an important part amongst the foods of the body. This is the bulky part supplied along with certain foods, such as the outer coverings of grain, as bran, or the cellulose or framework of leafy vegetables such as cabbage. Roughage helps to keep the food moving in the digestive tract, acting also as a conveyor of food materials. Bran does this as well as providing nutriment in the form of gluten and minerals.

Insufficient food, and food supplied in wrong proportion and variety, have a deleterious effect upon the body, especially upon that of the growing child. The shape and appearance of the body is affected, the mentality more or less weakened, and a general state of debility is the result.

Good nutrition shows itself in well-developed frame, straight back, legs and ankles, strong teeth, clean tongue, sweet breath, firm flesh with healthy colour, sparkling eyes with clear whites, glossy hair, and energetic attitude towards life in general, and a keen appetite for simple food. Proper food selection is therefore something that everybody needs to understand.

In planning meals always make the best possible use of fresh fruits, vegetables, and meats, avoiding the canned variety as much as possible, as the essential vitamins are more or less destroyed in the process of preservation.

To have attractive, pleasing meals it is necessary to plan how different textures and flavours, and sometimes even colours of foods combine. This is not a merely epicurean practice, for we are more likely to eat the right foods if they please eye and nose, and tongue as well. Hence in your meals have foods of different texture: some hard, some soft; some crisp; some juicy. It is good to remember sometimes that the use of left-overs is false economy of health and time, and even of materials, if it requires undue quantities of fresh supplies to make the former palatable.

The quantity of food as well as the quality of food for each person is of paramount importance; the growing child, or rather the adolescent, requires as much as the adult. Those engaged in heavy physical work require more than those of sedentary occupations. Again, temperature alters conditions and needs; cold climates demanding more than warm.

One of the best ways to estimate the quantity of food needed by a person or family is in terms of calories.

There is nothing mysterious about this term; it is simply the unit of measure of heat or fuel value. As the thermometer shows intensity of heat, the calorimeter shows the amount of heat; the first is measured by degrees, the latter by calories.

There are many tables published of the different foods—classified according to their heat or energy-producing value in calories. The following table is culled (and simplified) from the latest American authorities:—

#### Proteids:

- Milk (1 quart) gives 600 calories.
- Skimmed milk (1 quart) gives 300 calories.
- Beef (1 lb.) gives 1,000 calories.
- Poultry (1 lb.) gives 500 calories.
- Fish, fresh (1 lb.), gives 200 calories.
- Cheese (1 lb.) gives 2,000 calories.

#### Carbohydrates:

- Bread (1 lb.) gives 1,200 calories.
- Bread, whole wheat (1 lb.), gives 1,600 calories.
- Shredded meal (1 lb.) gives 1,650 calories.
- Oatmeal (1 lb.) gives 1,800 calories.

#### Sugars:

- Honey (1 lb.) gives 1,500 calories.
- Granulated sugar (1 lb.) gives 1,800 calories.
- Milk chocolate (1 lb.) gives 2,250 calories.

#### Hydrocarbons:

- Butter (1 lb.) gives 3,400 calories.
- Oil (1 lb.) gives 4,100 calories.
- Cream, 40 per cent. (1 lb. or 1 pint), gives 1,700 calories.
- Bacon (1 lb.) gives 2,600 calories.
- Salt pork (1 lb.) gives 2,850 calories.
- Almonds, shelled (1 lb.), gives 2,900 calories.
- Walnuts, shelled (1 lb.), gives 3,200 calories.

## Vegetables (fresh):

Asparagus (1 lb.) gives 100 calories.  
 Lima beans (1 lb.) gives 550 calories.  
 French beans (1 lb.) gives 175 calories.  
 Beets (1 lb.) gives 150 calories.  
 Cabbage (1 lb.) gives 100 calories.  
 Carrots (1 lb.) gives 150 calories.  
 Cauliflower (1 lb.) gives 150 calories.  
 Tomatoes (1 lb.) gives 100 calories.  
 Green peas (1 lb.) gives 250 calories.  
 Dried peas (1 lb.) gives 1,600 calories.  
 Potatoes (1 lb.) gives 300 calories.

**REPAIRING WOOD FENCES.**

Inserting new rails or posts in a fence is a troublesome job. An ordinary farm post and rail with no pales is comparatively easy, and there are ways of putting in a new rail with a minimum loss of time. "Farm, Field, and Fireside" in the accompanying illustration shows means of carrying out this work as expeditiously as possible. For instance, the rough-and-ready way is to fit one end into its corresponding mortise, cut it the right length to go through the mortise at its other extremity, and chop it to an elongated point A (Fig. 1). This end is pushed through its mortise

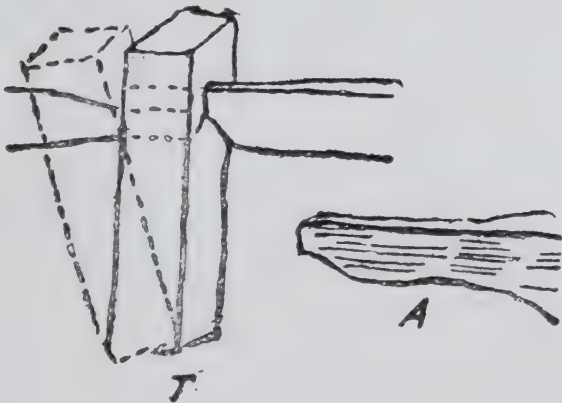


Fig. 1.

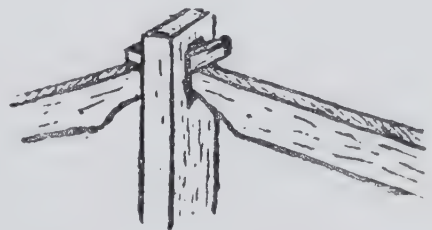


Fig. 2.

far enough to allow the rail to be driven back into its first or original bed. This weakens the rail and has not a good appearance. A better way is to loosen the post and push it back (Fig. 1) until the new rail can be got in; to effect this it may be necessary to ease the mortise somewhat with a chisel. Then the post is set up again.

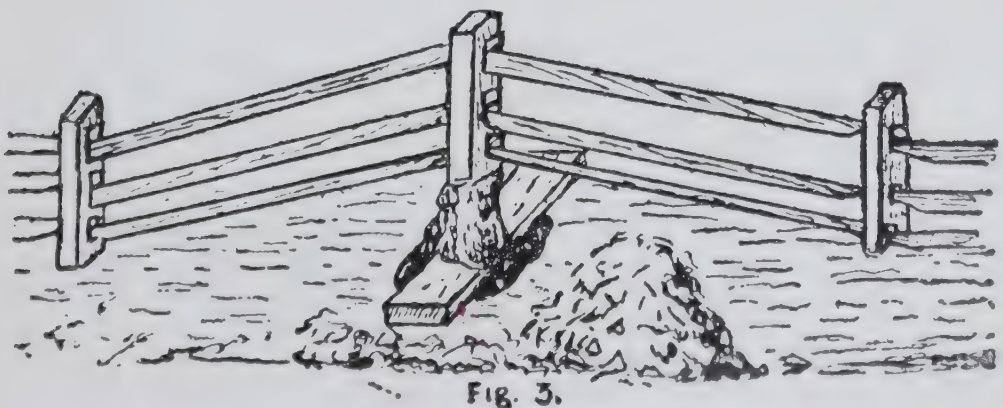


Fig. 3.

A broken post is renewed thus:—The old one is dug out and split to allow the rails to be released. The mortises in the substitute are made a little larger (say  $\frac{1}{4}$  inch each way) than the old ones, and the rails are inserted whilst the post is loose. The latter is then pushed into place and rammed.

Fig. 3 shows a better way. The faulty post is dug out. A plank is laid over the hole, and the new post previously mortised is stood on the plank and the rails are introduced as shown, any easement required being effected with a chisel. The plank is withdrawn and the post sinks into the hole. This method is not likely to split the post when adjusting the rails.



## General Notes.

### Arrowroot Board.

An Order in Council has been approved empowering the Arrowroot Board to give to the Commonwealth Bank the necessary security required by that bank for financial assistance rendered to the Arrowroot Board from the Rural Credits Branch.

### Queensland Cane Growers' Council.

By Regulation under the Primary Producers' Organisation and Marketing Act power has been given to any member of the Queensland Cane Growers' Council, if he be unable to attend any meeting of the council, to appoint a deputy to take his place at such meeting.

### Egg Board Levy.

By regulation made under the Primary Producers' Organisation and Marketing Act, His Excellency the Governor has removed the necessity for the Egg Board to obtain the authority of the Treasurer before operating on its Trust Account, into which the proceeds of the Egg Board Levy are paid.

### Atherton Tableland Maize Board.

An Order in Council has been issued under the Primary Producers' Organisation and Marketing Act empowering growers of maize to withhold from delivery to the Atherton Tableland Maize Board in any one year not more than 5 tons of the commodity for food for their families and/or live stock and for use as seed.

### Broom Millet, Peanut, Cotton, and Egg Boards.

Orders in Council have been approved inserting in previous orders, re the financing of the above Boards by the Commonwealth Bank, a further paragraph. This paragraph provides that any security shall cover future crops of the commodity concerned as well as the crop in existence at the time the security was given.

### Cane Levy—Maryborough District.

In previous Regulations issued under the Primary Producers' Organisation and Marketing Act, the Maryborough District Cane Growers' Executive was empowered to make a levy on suppliers to the Mount Bauple Central Mill at the rate of  $\frac{1}{2}$ d. per ton of cane delivered to that mill. The amount of the levy has now been fixed at the rate of  $\frac{3}{4}$ d. per ton. This alteration has been made by an amending regulation.

### The Diabolo Separator.

The Diabolo separator is now offered in six sizes, from 10 gallons up to 115 gallons, containing all worthwhile modern improvements. The fact claimed that for many years a greater number of separators has been manufactured in the Diabolo works than in any other separator factory in the world demonstrates its efficiency as part of a modern dairy farm plant. More than 1,000,000 machines of this type have been manufactured, and the yearly output is now 100,000 separators going out to every dairying country in the world. The Australian and New Zealand business shows a continued steady increase. The demand to-day is for higher efficiency in every department of industry, and only those separators that are proved by test to be exhaustive skimmers under everyday dairy conditions can survive on the market. The Diabolo is one of these. An agency has been established in Brisbane, and fuller particulars of their enterprise may be found in our business pages.

### Influences of an Agricultural Life.

"No one doubts that our national life would be the poorer by a decline in our rural life; but it is sometimes difficult to state in definite terms the extent of the loss," comments Professor Strong, of the Leeds University. "It is well known, however, that contact with the soil leads to an appreciation of nature and natural phenomena, which it is difficult, if not impossible, to obtain in any other way," he adds. "History and literature and art have shown throughout the ages that daily contact with the elemental forces of nature breeds independence of character, virility of mind, constancy of purpose—qualities included among those accounted worth while in life. And if perchance at times these are allied with other and less desirable accompaniments, the latter, more often than not, are attributable to causes which a well-organised national life could remove or control."

### Mackay Sugar Levies.

Regulations were approved on the 23rd July empowering the various District Canegrowers' Executives to make levies on sugar-growers in Queensland. The levy to be paid by suppliers to the Mackay sugar mills was approved to be at the rate of 2d. per ton of cane delivered, but the Regulations have now been amended providing that the levy, in so far as the Mackay mills are concerned, shall be at the rate of 1d. per ton of cane delivered.

### Levies by Sugar Mill Suppliers' Committees.

The following Mill Suppliers' Committees have been empowered, by Regulation, to make levies at the rates mentioned opposite the names of such Committees:—

Hambledon Mill Suppliers' Committee—one farthing;

Pleystowe Mill Suppliers' Committee—one penny;

Tully Mill Suppliers' Committee—one farthing

per ton of cane delivered to the Hambledon, Pleystowe, and Tully Mills respectively, during the season commencing 1st May, 1927, and ending on 28th February, 1928. Provision is made, however, for the taking of polls in connection with such levies, if demand for such polls is made by at least eighty growers concerned. The amounts of the levies shall be used as follows:—In the case of Hambledon, for the purpose of defraying administrative expenses of the Hambledon Mill Suppliers Association; in the case of Pleystowe, for the purpose of defraying expense of a check weighman; and, in the case of Tully, for administrative and other minor expenses of the Mill Suppliers' Committee.

### Wheat Board Election.

Nominations for the election of five members to the State Wheat Board:

District No. 1.—(1921 Electorates of Maranoa, Dalby, Nanango, and Murilla, with the exception of the Goondiwindi Division), Robert Swan, Wallumbilla (returned unopposed).

District No. 2.—1921 Electorate of Pittsworth), Arthur Carl Krieg, Brookstead (returned unopposed).

District No. 3.—(1921 Electorates of Warwick, Carnarvon, and the Goondiwindi Division of Murilla, and the Warwick and Killarney Divisions of the Cunningham Electorate), Alexander N. Allen, Campbell's Plains; Bergittinus C. C. Kirkegaard, Freestone.

District No. 4.—(1921 Electorate of Cunningham, with the exception of the Warwick and Killarney Divisions), Thomas Muir (returned unopposed).

District No. 5.—(Old Electorates of Lockyer, Drayton, Aubigny, Toowoomba, and East Toowoomba), John Archibald, Oakey; Patrick McNee, Kingsthorpe.

### Proposed Honey Pool.

A poll to decide the question of the constitution of a Honey Pool, to include all owners of five hives of bees and over, was taken at the Department of Agriculture and Stock, Brisbane, recently, with the following results:—

For the setting up of a Honey Board .. 171 votes (55.5 per cent.)

Against the setting up of a Honey Board 137 votes

As the necessary two-thirds majority was not secured, the proposal was therefore defeated.

Alternative proposals for a poll to comprise only owners of fifteen hives of bees and over, and thirty hives of bees and over, respectively, were also submitted to growers, and in both cases the necessary majority was not obtained.

The voting of the proposals was as follows:—

*Owners of fifteen hives of bees and over.*

For the setting up of a Honey Board .. 128 votes (59.5 per cent.)

Against the setting up of a Honey Board 87 votes

*Owners of thirty hives of bees and over.*

For the setting up of a Honey Board .. 86 votes (60.5 per cent.)

Against the setting up of a Honey Board 56 votes



### Proposed Queensland Maize Board.

The counting of votes in connection with the proposed Maize Board was conducted at that Department on 6th August, with the following results:—

For the setting up of a Maize Board ..	1,924 votes (37.4 per cent.)
Against the setting up of a Maize Board ..	3,225 votes (62.6 per cent.)
Informal and incomplete ..	115 votes

5,264 votes

The details of the voting on this question are given hereunder:—

District.	For.	Against.	Total.	Informal and Incomplete.
No. 1 (Moreton)—5,847 growers	405	1,448 78.1 per cent. against	1,853	37
No. 2 (Darling Downs and Maranoa)—4,880 growers	738	1,492 66.9 per cent. against	2,230	49
No. 3 (Rest of Queensland, except Atherton District) 4,113 growers	781	285 73.2 per cent. for	1,066	29
	1,924	3,225	5,149	115

Mr. C. Sheehy, of the Council of Agriculture, and Mr. F. T. Keable, of Tannymorel, were present at the counting of the votes.

### The Royal Society of Queensland.

The ordinary monthly meeting of the society was held in the Geology Lecture Theatre on Monday, 28th July.

The President (Professor E. J. Goddard) was in the chair.

The President referred to the death of Dr. Taylor, a trustee of the society, and extended sympathy to his relatives.

The President announced that the society had been represented on a deputation in connection with the proposed open season for native bears, and that there was no need for further action on the matter at this meeting.

Dr. F. W. Whitehouse exhibited a collection of carboniferous corals from the Lion Creek Limestone, near Stanwell. These included *Syringopora syrinx* Eth. fil., sp. nov., \**Michelinia* sp., \**Palaeosmia retiformis* (Eth. fil.), *Amygdalophyllum inopinatum* (Eth. fil.), *Lithostrotion columnare* (Eth. fil.), and \**Petalaxis* sp. nov., the species marked with an asterisk being new records. He suggested that the coral limestones interbedded in the Lower Carboniferous mudstones at many localities in Eastern Australia were all on much the same horizon, that horizon being the equivalent of D<sub>2</sub> in the European zonal succession.

Dr. W. H. Bryan read a paper by Professor H. C. Richards and himself entitled "Volcanic Mud Balls in the Brisbane Tuff." The paper dealt with a very unusual form of volcanic ejecta in the form of spheroidal pellets of concentric structure found by the authors at Castra, on the Tingalpa Creek, 12 miles east-south-east of Brisbane. The only closely similar volcanic product seems to have been formed by the eruption of Taal Volcano in the Philippine Islands in 1911. This was described by Pratt, whose explanation of the spheroids as the result of condensation of the mud balls above the volcano in much the same manner as in the formation of summer hail. Professor Richards added some comments on the paper, which was discussed by Drs. E. O. Marks and F. W. Whitehouse, Messrs. Dormer, Tommerup, Herbert, Denmead, Morwood, Professor Parnell, and the President.

Professor Parnell then took the chair, and a lecture on "Bunchy Top of the Banana," illustrated by specimens and lantern slides, was delivered by Professor Goddard. He dealt with the history of the disease in Australia from its introduction from Fiji to the present, described the symptoms, methods of investigation of the problem, and the treatment. It was pointed out that all members of the genus *Musa* are susceptible, including the wild bananas of North Queensland. A vote of thanks to the lecturer was moved by Mr. Longman and seconded by Professor Richards, but, owing to the lateness of the hour, no discussion of the paper took place.

### Fish and Mosquito Control.

Success of experiments to exterminate malaria mosquitoes in Italy and Spain by the use of an American fish called "gambusia" introduced into those countries, is reported by the Bureau of Fisheries, of the Department of Commerce, U.S.A.

The experiment was attempted several years ago, when a shipment of gambusia was made from the United States to Europe to wage war against malaria mosquitoes in certain parts of Italy and Spain.

The original shipment of fish was sent to Spain, from which a number were sent to Italy. Their activities against the mosquito in that country were so successful that the gambusia have now been distributed over many parts of Italy, and have been introduced from that country, either directly or indirectly, into Germany, Russia, and Yugoslavia.

The original shipment of gambusia was placed in a pond in Spain, where they multiplied very rapidly. A year after their introduction in that country, several hundred were placed in the Lago di Porto, in Italy, a body of water which had been swarming with mosquito larvæ. It is said that a specimen of this larvæ is now rarely seen about the lake.

It is stated by an Italian scientist that complete mosquito control is obtainable with gambusia if there is complete control of vegetation in the infested region. Vertical vegetation, he said, leaves to gambusia the possibility of complete destruction, while horizontal vegetation often prevents efficient control. The reduction to a minimum of mosquito breeding without the use of a drop of petroleum is reported for extensive areas in Italy, a result never before obtained.

### Staff Changes and Appointments.

Mr. J. C. Lamont has been appointed Trappers' Representative on the Moreton Opossum Board during the absence of Mr. G. W. Martens.

Mr. R. Veitch, Entomologist in Chief, Mr. J. H. Simmonds, Plant Pathologist, and Mr. A. A. Girault, Assistant Entomologist, have been appointed Inspectors under the Diseases in Plants Acts.

Mr. J. Bishop, of Beaudesert, has been appointed Inspector of Stock, and will be stationed at Ravensbourne.

Messrs. L. D. Carey and R. J. T. Kidd, Inspectors of Stock at Emerald and Mackay, respectively, have been appointed Collectors of Royalty in connection with the Animals and Birds Acts, *vice* Messrs. E. J. Tannock and S. J. Monaghan respectively, transferred.

Mr. Norman James, of Cedar Creek, has been appointed an Honorary Inspector under the Diseases in Plants Acts.

Mr. P. Kirwan, of Mackay, has been appointed Cane Growers' Representative on the Farleigh Local Sugar Cane Prices Board, *vice* Mr. A. S. Hamilton, resigned.

The following have been appointed Officers under and for the purposes of the Animals and Birds Acts:—

P. Rumball, Poultry Instructor, Department of Agriculture and Stock, Brisbane;

John Archer, Malchi;

E. C. House, Torilla Station;

M. P. Mallon; and

P. J. Ryan, of Dugandan Homestead, Boonah.

The services of Mr. J. C. Pryde, as Temporary Inspector of Stock, Toowoomba, have been continued from 13th August, 1927, to 20th September, 1927.

Mr. N. C. Copeman, of Toowoomba, has been appointed an Inspector of Stock.

The Officer in Charge of Police, Dalby, has been appointed Acting Inspector of Stock at Dalby.

Mr. A. E. Pascoe, of Yeppoon, has been appointed Honorary Inspector, Diseases in Plants Acts.

Messrs. H. Walker (Mount Glorious) and A. G. Maddox (Tarome, *viâ* Kalbar) have been appointed Officers under and for the purposes of the Animals and Birds Acts.

Mr. G. A. Currie, Assistant Entomologist, Cotton Section, previously attached to the Callide Cotton Research Farm, Bilcocka, has been transferred to Brisbane.

Mr. S. M. Watson, Assistant to Entomologist, at present attached to Brisbane, will be transferred to Stanthorpe, as from the 13th August, 1927.



### Sugar Mill Suppliers' Committees.

Approval has been given to the Queensland Cane Growers' Council to appoint the following members to complete the representation of the Mill Suppliers' Committees below mentioned:—

- Maryborough Mill Suppliers' Committee, J. C. Kinbacker, Bidwell, via Maryborough;
- Bingera Mill Suppliers' Committee, Mr. O. Peterson, Pine Creek, Electra, Bundaberg;
- North Eton Mill Suppliers' Committee, Mr. C. H. C. Ross, Eton, Mackay, Mr. W. Leeson, Eton, Mackay;
- Cattle Creek Mill Suppliers' Committee, Mr. T. Etwell, Kowari Siding, Hatton Line, Mackay; and
- Hambledon Mill Suppliers' Committee, Mr. W. Thompson, Edmonton, via Cairns.

### Sugar Mill Suppliers' Committees—Regulation Rescinded.

Regulation 125 under the Primary Producers' Organisation and Marketing Act with regard to the official roll for the purpose of election of Mill Suppliers' Committees and District Cane Growers' Executives has been rescinded, and for Regulation 125 the new Regulation provides that the official roll for the purpose of the election shall embody—

- (a) The latest roll of suppliers to each mill as obtained from the Central Sugar Cane Prices Board;
- (b) A supplementary roll compiled by the mill and certified to by the Secretary of the Mill Suppliers' Committee;
- (c) The name of any person whose name is not included in (a) or (b) who forwards a statutory declaration that he has an area of not less than five acres of cane, and is a bona fide supplier to the named mill.

### Sugar Levies.

By regulations made under the Primary Producers' Organisation and Marketing Act, the Queensland Cane Growers' Council has been empowered to make a levy at the rate of  $\frac{3}{4}$ d. per ton of cane harvested during the season ending on the 29th February, 1928. This levy will be utilised for administrative purposes.

The Cane Growers' Council is also empowered to make a further levy at the rate of 1d. per ton of cane harvested during the season ending on the 29th February, 1928, such levy to be utilised for the purpose of creating an advance fund for the sugar industry. Provision is made, however, for a poll to be taken as to whether the levy shall be made if a request for such a poll is made by at least 100 growers of sugar-cane on or before the 23rd August, 1927.

All District Cane Growers' Executives constituted under the Queensland Cane Growers' Council are also empowered by these Regulations to make levies on growers of sugar-cane supplying cane to the mills represented on such Cane Growers' Executives, such levies to be expended only in the interests of District Executives and Mill Suppliers' Committees for administrative purposes, in the supply of stationery, stamps, &c., and other minor incidental expenditure. These levies range from  $\frac{1}{4}$ d. to  $2\frac{1}{2}$ d. per ton of cane supplied.

Provision is made for the taking of a poll on the question as to whether any of these levies shall be made. In addition to the levies by District Cane Growers' Executives, the Bundaberg District Cane Growers' Executive is empowered to make a levy at the rate of 1d. per ton of cane delivered by the Booyal Branch of the Isis Central Mill Suppliers' Committee, and a levy at the rate of  $1\frac{1}{2}$ d. per ton of cane delivered by the Pialba District Branch of the Isis Central Mill Suppliers' Committee to the Isis Central Mill, the amount of such levies to be respectively expended only in the interests of the branches for the purpose of financing the local organisation work, payments for hire of halls, &c.

The Southern District Cane Growers' Executive is also empowered to make an additional levy at the rate of  $1\frac{1}{4}$ d. per ton of cane delivered to the Moreton Central Mill and  $\frac{1}{2}$ d. per ton of cane delivered to the Rocky Point Mill, the proceeds of such levies respectively to be used for the purposes only of the Moreton Mill Suppliers' and the Rocky Point Mill Suppliers' Committees. Polls may also be taken in connection with these additional levies.

Department of Agriculture and Stock,  
Brisbane, 1st September, 1927.

**H**IS Excellency the Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Primary Producers' Organisation and Marketing Act of 1926*," been pleased to make additional Regulations to the following effect.

W. FORGAN SMITH.

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### **Cotton Board Levy.**

184. Subject to the following proviso, the Cotton Board is hereby empowered to make on all growers delivering seed cotton to ginneries a particular levy at the rate of  $\frac{1}{4}$ d. per lb. of cotton so delivered as from 1st January, 1927, to 31st December, 1931, provided that if at least 100 growers of cotton who delivered seed cotton to ginneries during the years 1926 or 1927, on or before the third day of October, 1927, make, in writing to the Minister, a request for a poll on the question of the levy proposed to be made in respect of the cotton so delivered, a poll of such growers shall be held by the Under Secretary, Department of Agriculture and Stock, and, if upon such poll the majority of votes is against the making of such levy, such levy shall not be made.

185. The amount of such levy shall be deducted by the Cotton Board from payments due by that Board to cotton-growers as above described, and shall be paid by the manager of such Board into a Capital Fund, to be expended only in effecting any object which may be in the common interest of cotton-growers determined by the Cotton Board.

186. Any person who commits a breach of either of the above Regulations (Nos. 184 and 185) shall be guilty of an offence, and shall be liable to a penalty not exceeding five pounds.

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Department of Agriculture and Stock,  
Brisbane, 1st September, 1927.

**H**IS Excellency the Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Primary Producers' Organisation and Marketing Act of 1926*," been pleased to make additional Regulations to the following effect.

W. FORGAN SMITH.

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### **Mossman Mill Levy.**

180. Subject to the following proviso, the Mossman Mill Suppliers' Committee is hereby empowered to make particular levies on primary producers in the sugar-growing industry and operations in the following locality, that is to say:—

The lands assigned to the Mossman Mill under "*The Regulation of Sugar Cane Prices Acts, 1915 to 1922*"—

at the following rate, that is to say:—

Fourpence per ton on all sugar-cane delivered from the locality above referred to—

during the period commencing 1st May, 1927, and ending on the 29th February, 1928: Provided that if at least seventy primary producers in such industry and operations as aforesaid in the locality constituted by the lands assigned to the



Mossman Mill on or before the Twenty-seventh day of September, 1927, make, in writing to the Minister, a request for a poll on the question of the levy proposed to be made in respect of the sugar-cane delivered at such mill, a poll of all primary producers in such industry and operations as aforesaid in the said locality shall be held by the Under Secretary of the Department of Agriculture and Stock, and if upon such poll the majority of votes is against the making of such levy, such levy shall not be made.

181. The amount of every such levy shall be deducted by the manager of the Mossman Mill from the cane payments due by such mill to sugar-cane growers in the locality constituted by the lands assigned to such mill, and shall be paid by the said manager to the Secretary of the Mossman Mill Suppliers' Committee, which shall utilise same for administrative purposes in connection with the conduct of an office and payment of a Secretary and Paymaster for the harvesting of the cane of suppliers to the Mossman Mill. The amount of such levy shall be deducted from all cane supplied during the preceding month, and shall be paid not later than the fifteenth day of the succeeding month.

182. The Secretary of the Mossman Sugar Mill Suppliers' Committee shall furnish to the Minister, not later than the 31st March, 1928, an audited statement setting out in detail the receipts from such levy and the disbursements therefrom.

183. Any person who commits a breach of any of these Regulations (Nos. 180 to 182 inclusive) shall be guilty of an offence, and be liable to a penalty not exceeding five pounds.

## A GARDEN STILE.

This illustration depicts a stile suitable for placing over fences adjoining home paddocks. Hard or soft wood, 3 inches x 1½ inch, would be suitable for the sides, 3 inches x ¾ inch for the steps, and 6 inches x 1 inch for the top. The height of the stile should be sufficient to clear the top wire of the fence. The cross stays to keep the legs from spreading should be made of 3 inches x 1 inch hardwood, and the whole

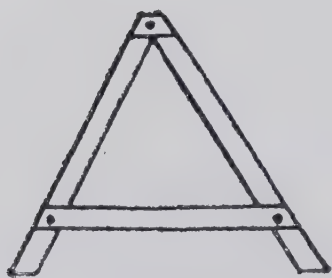


Fig. 1.

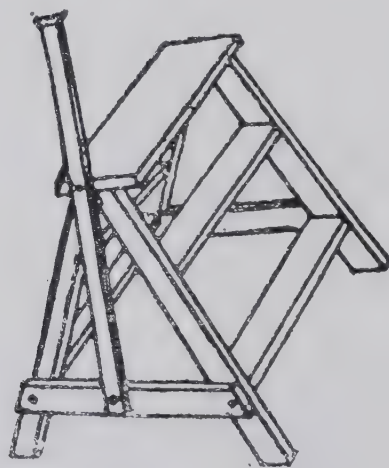


Fig. 2.

structure will be strengthened if these are fastened through by long ½-inch bolts. These must be put on after the stile has been placed in position. The width of the stile may be 18 inches to 2 feet. An upright of 2 inches x 1 inch projecting 2 feet 6 inches above the top serves as a hand rail. Planed timber should be used, and finished with two coats of white paint.—“Australasian.”

### Banana Plant Prohibition applied to Goomboorian

A Proclamation has been issued under the Diseases in Plants Acts prohibiting the introduction of banana plants into the Goomboorian district.

### The Three D's.

Three things are mainly responsible for the prolific breeding of bacteria in the milking shed, those being dirt, damp, and darkness. Often with little expense the necessary alteration can be made, and sunlight made available for purifying the shed. So great is the value of sunlight that many medical men advocate the sunbathing of wounds as a destroyer of germs and as a curative agent. What sunlight can do in the killing of bacteria in wounds it can do in slaying their fellows in your milking shed. The concrete-floored shed, kept scrupulously clean, open to the sunlight, will be the shed from which the cleanest supplies of the factory are drawn.

### Butter Board Election.

Following is the result of the ballot for a Northern Representative on the Butter Board:—

William James Sloan (Malanda)	..	..	..	166 votes
Walter Scott (Pearamon)	..	..	..	131 votes
Wilfred Alexander Johnston (Ravenshoe)	..	..	..	75 votes
James Reed (Malanda)	..	..	..	47 votes
Informal	..	..	..	4 votes

Mr. Sloan will, therefore, be appointed, and will hold office until the 18th February, 1928.

If you like this issue of the Journal, kindly bring it under the notice of a neighbour who is not already a subscriber. To the man on the land it is free. All that he is asked to do is to complete the Order Form on another page and send it to the Under Secretary, Department of Agriculture and Stock, together with a shilling postal note, or its value in postage stamps, to cover postage for twelve months.

### Erection and Care of Farm Buildings.

At a recent farmers' meeting at Beetaloo Valley, South Australia, a local farmer, Mr. H. C. Cook, read a paper on this subject. The buildings, he said, had a very important bearing, both mentally and physically, on the lives of the people on the farm. Care should be taken to erect them in convenient positions, and have them of useful design, when unnecessary work would be avoided. In designing the house, most attention should be given to comfort. In most districts there should be as much veranda as possible around the house to protect the walls from rain and sun. Particular attention should be given to the kitchen and washhouse. A pantry and bathhouse should be included, if possible, also a cellar and underground tank. He also advised farmers to use septic tanks; they gave complete satisfaction and would last a lifetime. The implement shed should be constructed of stone with an iron roof. The roof should be as high as possible, and the shed would then be much cooler during the summer months. The blacksmith's shop could be placed under the same roof. The stable should have stone walls with a straw roof. Cement concrete should be used for the floor of the chaffhouse. He would also arrange to have a circular saw work off the same engine as the chaffcutter, and construct a small shed in which to keep the firewood. Galvanised iron could be used for the protection of hay against mice. Concrete, with timber along the top, could also be used for the same purpose. The cowshed should be separate from the horse yards, and should consist of a spacious yard and comfortable shed. The pigsty should also have a large run and dry shed which was easy to clean, and should be placed at a distance from the house. The barn should be mice and rat proof. If it was built of stone it should be flushed with cement and have a concrete floor. It could also be made rat-proof outside by placing timber around the walls near the roof, with a 6-in. flange of galvanised iron on top. A window or two could be built above the timber. A good discussion followed.



**Cheese Board Election.**

Cheese Board Election results—

	Votes.
Henry Thomas Anderson, Biddeston .. ..	628
William Thomas Harris, Toowoomba .. ..	523
David Gabriel O'Shea, Southbrook .. ..	502
Alfred John Harvey, Pittsworth .. ..	468
George Burton, Cambooya .. ..	395
Mads Peter Hansen, Malling, MacLagan .. ..	387
William Dearling, Oakey .. ..	378
Albert George Tilley, Rosehill, S. and W. Railway ..	363
Thomas Dare, Woodleigh .. ..	295

The first five, together with the Director of Marketing, will therefore be appointed, and they will hold office throughout the term of the Board, which is for a period of three years as from the 1st August, 1927. Should any vacancy occur in the elected members of the Board it is to be filled by election by the growers, and the person so elected will hold office until the expiration of the term for which his predecessor would have held office.

**Safety in Silage.**

Every wheat-grower should keep a flock of sheep to assist in the effective working of the farm. The number of sheep carried will depend upon the country and the locality, but to carry the maximum number he should put down two or more 100-ton pits of silage—either wheat, oats, or barley can be used. If this is done it greatly assists in the economical working of the farm; and sufficient sheep can always be carried to make use of the stubble and rubbish growing on the fallows without the necessity for keeping a large area of grass as a reserve in case of a drought year.

The making of silage can be fitted into the operations on a wheat farm without interfering unduly with the production of hay or grain. When it is intended to produce either hay or grain, seed must be sown at such a time as will ensure that the crop will be ready to harvest when the weather is suitable for the purpose; it would be disastrous to sow too early. Silage, however, may be made equally as well in June as in October, or in any other month; and thus crops intended for silage may be sown before the hay or grain crop, and cut and pitted before haymaking is commenced.

Under present conditions, it is hardly possible for many wheat-farmers to carry more than a few sheep profitably, as the natural grasses of their holdings are not sufficient, even when helped by the wheat stubble, to provide feed for any length of time. There is no great inducement for a farmer to grow crops specially for feed when he knows that he will have to wait until the crops are ready before he can buy; and that he will then have to pay such a high price, because of the number of other farmers in the same position, that he will not be recompensed for the cost of growing the crop.

It is undeniable that a better system of rotation is required in the wheat areas of this State (N.S.W.) than the almost universal wheat and bare fallow. Sound as the practice of fallowing is, the adoption of it as the sole rotation with wheat will, within a very few years, so reduce the supply of humus in the soil that the yields of wheat will no longer be profitable. Such a condition is already arising in many soils, and will become more pronounced as time passes. In this country, where the rainfall is so uncertain, one of the most important constituents of the soil is humus; because it is one of the prime factors in helping the soil to retain moisture for a long period, and even the best fallowing will not yield good results in its absence.

The only practical means of restoring or maintaining a good supply of this invaluable constituent, other than allowing the land to lie out in grass for a long period, is to grow upon it, in rotation with wheat, a crop which can be fed down by sheep. The remains of the plants left by the sheep, and their excrement, become humus, and thus give to the soil the desirable moisture-retaining character.

The conservation of silage will enable the farmer to adopt such a rotation with greater certainty that he will make a good direct profit from his green crops, and also a larger indirect one, because he will be in the position of being able to stock his land to its full capacity. Unless a reserve of fodder is held it is unsafe to increase his flock, as the green crops may fail to grow at the expected time, owing to the absence of rain.

Moreover, a full silage pit enables him to lamb his ewes with certainty. Should a dry season threaten at the mating time, he need not be afraid to join the rams in the usual way.—A. and P. Notes, N.S.W. Dept. Ag.

## Answers to Correspondents.

### BOTANY.

*Selections from the outward mail of the Government Botanist, Mr. C. T. White, F.L.S., which are of general interest.*

#### Mangroves.

A.M., Sydney, N.S.W.

The negatives of *Bruguiera* and *Ceriops* returned by you came safely to hand. I am glad they proved of service to you. Many thanks for the slide of *Rhizophora mucronata* from the negative taken by Allan McCulloch. I got a splendid photograph the other day of *Ægiceras* showing the root system, but this, I understand, you already have. One can see all these and other mangroves within a few miles of Brisbane. I am collecting photographs with the idea of publishing an article on the mangrove flora of Moreton Bay.

#### Specimens Identified.

INQUIRER, Brisbane—

The specimens from Atherton were very fragmentary; but, as far as the material allows, have been determined as follows:—

No. 1.—Leaves only. Impossible to determine.

No. 2.—*Stenocarpus reticulatus*.

No. 4.—*Darlingia ferruginea*. This tree is only known botanically from the leaves. It would be most interesting to obtain complete material—flowers and fruit.

No. 5.—*Cupania serrata* (?). Family *Sapindaceæ*.

The specimens collected by Forest Assistant Rankin at Yarraman have been determined as follows:—

84.—*Bursaria incana*.

85.—*Acronychia lævis* var. *purpurea*.

86.—*Eucalyptus eugenioides*. White stringy-bark.

87.—*Elæodendron australe*.

88.—*Celastrus australis*.

89.—*Sicyos angulata*.

90.—*Acacia glaucocarpa*.

91.—*Acacia Cunninghamii*.

92.—*Nephelium connatum*.

93.—*Canthium latifolium*.

94.—*Canthium buxifolium*.

## Farm and Garden Notes for October.

FIELD.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, cowpeas, sorghums, millet, panicums, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, tumeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred.

KITCHEN GARDEN.—Our notes for this month will not vary much from those for September. Sowings may be made of most vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagasear beans should also be sown. Sow the dwarf Lima beans in rows 3 feet apart with 18 inches between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the plants will be drawn



and worthless. Thin out melon and cucumber plants. Spraying for fungoid diseases should be attended to, particularly all members of the *Cucurbitaceæ* and *Solanum* families, of which melons and tomatoes are representative examples. Give plenty of water and mulch tomatoes planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

FLOWER GARDEN.—The flower garden will now be showing the result of the care bestowed upon it during the past two months. The principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant tuberose, crinum, ismene, amaryllis, panceratium, hermocallis, hippeastrum, dahlias, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphids, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.

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## Orchard Notes for October.

### THE COASTAL DISTRICTS.

October is frequently a dry month over the greater part of Queensland, consequently the advice that has been given in the notes for August and September regarding the necessity of thorough cultivation to retain moisture is again emphasised, as, unless there is an adequate supply of moisture in the soil to meet the trees' requirements, the coming season's crop will be jeopardised, as the young fruit will fail to set.

Thorough cultivation of all orchards, vineyards, and plantations is therefore imperative if the weather is dry, as the soil must be kept in a state of perfect tilth, and no weeds of any kind must be allowed to grow, as they only act as pumps to draw out the moisture from the soil that is required by the trees or fruit-yielding plants. Should the trees show the slightest sign of the want of moisture, they should be given a thorough irrigation if there is any available means of doing so, as it is unwise to allow any fruit trees to suffer for want of water if there is a possibility of their being supplied with same. Intermittent growth, resulting from the tree or plant being well supplied with moisture at one time and starved at another, results in serious damage, as the vitality is lessened and the tree or plant is not so well able to ward off disease. A strong, healthy, vigorous tree is frequently able to resist disease, whereas when it has become debilitated through neglect, lack of moisture or plant food, it becomes an easy prey to many pests. If an irrigation is given, see that it is a good one and that the ground is soaked; a mere surface watering is often more or less injurious, as it is apt to encourage a false growth which will not last, and also to bring the feeding roots to the surface, where they are not required, as they only die out with a dry spell and are in the way of cultivation. Irrigation should always be followed by cultivation, so as to prevent surface evaporation and thus retain the moisture in the soil.

All newly planted trees should be carefully attended to, and if they show the slightest sign of scale insects or other pests they should receive attention at once. All growth not necessary to form the future tree should be removed, such as any growths on the main stem or main branches that are not required, as if this is done now it will not only save work later on, but will tend to throw the whole strength of the tree into the production of those limbs that will form the permanent framework of the tree. In older trees all water sprouts or other similar unnecessary growths should be removed.

Keep a good lookout for scales hatching out, and treat them before they have become firmly established and are coated with their protective covering, as they are very easily killed in their early stages, and consequently much weaker sprays can be used. The best remedies to use for young scales hatching out are those that kill the insects by coming in contact with them, such as miscible oils, which can be applied at a strength of 1 part of oil in 40 parts of spraying material and will do more good than a winter spray of double the strength. In the use of miscible oils or kerosene emulsion, always follow the directions given for the use of these spraying

materials, and never apply them to evergreen trees when they are showing signs of distress resulting from a lack of moisture in the soil, as they are then likely to injure the tree, whereas if the tree is in vigorous growth they will do no harm whatever.

All leaf-eating insects should be kept in check by the use of an arsenate of lead spray, taking care to apply it as soon as the damage appears, and not to wait till the crop is ruined. Crops, such as all kinds of cucurbitious plants, tomatoes, and potatoes are often seriously injured by these insects, and the loss occasioned thereby can be prevented by spraying in time. In the case of tomatoes and potatoes, a combined spray of Bordeaux or Burgundy mixture and arsenate of lead should be used, as it will serve the dual purpose of destroying leaf-eating insects and of protecting the plants from the attack of Irish blight.

Grape vines require careful attention, and, if not already sprayed with Bordeaux mixture, no time should be lost in applying this material, as the only reliable method of checking such diseases as anthracnose or black spot and downy mildew is to protect the wood and foliage from the attack of these diseases by providing a spray covering that will destroy any spores that may come in contact with them. The planting of bananas and pineapples can be continued during this month. See that the land is properly prepared and that good healthy suckers only are used. Keep the plantations well worked, and allow no weed growth. Keep a very careful lookout for fruit flies; destroy every mature insect you can, and gather and destroy every fallen fruit. If this is done systematically by all growers early in the season, the subsequent crop of flies will be very materially decreased. See that all fruit sent to market during the month is carefully handled, properly graded, and well packed—not topped, but that the sample right through the case or lot is the same as that of the exposed surface.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS

Much of the matter contained under the heading of “The Coast Districts” applies equally to these parts of the State, as on the spring treatment that the orchard and vineyard receives the succeeding crop of fruit is very largely dependent. All orchards and vineyards must be kept in a state of perfect tilth, and no weed growth of any kind should be allowed. In the Western districts, irrigation should be given whenever necessary, but growers should not depend on irrigation alone, but should combine it with the thorough cultivation of the land so as to form and keep a fine soil mulch that will prevent surface evaporation.

All newly planted trees should be carefully looked after and only permitted to grow the branches required to form the future tree. All others should be removed as soon as they make their appearance. If there is any sign of woolly aphis, peach aphis, or scale insects, or of any fungus diseases on the young trees, these diseases should be dealt with at once by the use of such remedies as black leaf forty, Bordeaux mixture, or a weak oil emulsion. In older trees, similar pests should be systematically fought, as if kept in check at the beginning of the season the crop of fruit will not suffer to any appreciable extent. Where brown rot has been present in previous years, two or more sprayings with Bordeaux mixture can be tried, as they will tend to check other fungus growths, but at the same time the sodium or potassium sulphide sprays are more effectual for this particular disease and should be used in preference when the fruit is nearly full grown. All pear, apple, and quince trees should be sprayed with arsenate of lead—first when the blossom is falling, and at intervals of about three weeks. Spraying for codlin moth is compulsory in the fruit district of Stanthorpe, and wherever pomaceous fruit are grown it must be attended to if this insect is to be kept in check.

In the warmer parts a careful check should be kept for any appearance of the fruit fly, and, should it be found, every effort should be made to trap the mature insect and to gather and destroy any affected fruit. If this is done, there is a good chance of saving the earlier ripening summer fruits, if not the bulk of the crop. Tomato and potato crops will require spraying with Bordeaux mixture, as also will grape vines. Keep a very strict watch on all grape vines, and, if they have not already been treated, don't delay a day in spraying if any sign of an oil spot, the first indication of downy mildew, appears on the top surface of the leaf. Spraying with Bordeaux mixture at once, and following the first spraying up with subsequent sprayings, if necessary, will save the crop, but if this is not done and the season is favourable for the development of the particular fungus causing this disease, growers can rest assured that their grape crop won't take long to harvest.

Where new vineyards have been planted, spraying is also very necessary, as if this is not done the young leaves and growth are apt to be so badly affected that the plant dies.



# **ASTRONOMICAL DATA FOR QUEENSLAND.**

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

## **TIMES OF SUNRISE, SUNSET, AND MOONRISE.**

AT WARWICK.

MOONRISE.

1927.	SEPT.		OCTOBER.		SEPT.	OCT.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	6.8	5.36	5.34	5.50	a.m. 8.56	a.m. 8.36
2	6.7	5.36	5.33	5.51	9.26	9.15
3	6.6	5.37	5.32	5.52	10.0	10.1
4	6.5	5.37	5.31	5.52	10.38	10.53
5	6.4	5.38	5.29	5.53	11.20	11.49
6	6.2	5.38	5.28	5.53	p.m. 12.9	p.m. 12.48
7	6.1	5.39	5.27	5.54	1.4	1.53
8	6.0	5.40	5.25	5.54	2.4	2.59
9	5.59	5.40	5.24	5.55	3.7	4.6
10	5.58	5.41	5.23	5.55	3.15	5.13
11	5.57	5.41	5.22	5.55	5.22	6.21
12	5.56	5.42	5.22	5.56	6.29	7.30
13	5.54	5.43	5.21	5.56	7.36	8.38
14	5.53	5.43	5.20	5.57	8.42	9.46
15	5.52	5.44	5.19	5.57	9.49	10.15
16	5.51	5.44	5.18	5.58	10.55	11.51
17	5.50	5.45	5.17	5.59	12.0	...
18	5.48	5.45	5.16	5.59	a.m. ...	a.m. 12.46
19	5.47	5.46	5.14	6.0	a.m. 1.1	1.36
20	5.46	5.46	5.13	6.1	1.58	2.18
21	5.45	5.46	5.12	6.1	2.50	2.56
22	5.44	5.47	5.11	6.2	3.36	3.29
23	5.43	5.47	5.10	6.2	4.17	4.0
24	5.42	5.47	5.9	6.3	4.53	4.30
25	5.41	5.47	5.8	6.4	5.25	4.59
26	5.40	5.48	5.7	6.4	5.57	5.30
27	5.38	5.48	5.7	6.5	6.27	6.2
28	5.37	5.48	5.6	6.6	6.56	6.36
29	5.36	5.49	5.5	6.6	7.27	7.14
30	5.35	5.49	5.4	6.7	8.0	7.56
31			5.4	6.8		8.48

## **Phases of the Moon, Occultations, &c.**

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

4 Sept. ☾ First Quarter 8 44 p.m.  
 12 „ ○ Full Moon 10 53 a.m.  
 18 „ ☾ Last Quarter 1 29 p.m.  
 26 „ ● New Moon 8 10 a.m.

Perigee 13th September, at 3 42 a.m.  
 Apogee 28th September, at 9 6 a.m.

At the beginning of this month the Southern Cross will be prone, lying on its right side 30 degrees west of the South Celestial Pole, at about 8 p.m. Mercury will be in superior conjunction with the Sun on the 2nd, that is, on the far side of its orbit, almost behind the Sun. Towards the end of the month it will be well above the horizon after sunset, but not well situated for observation.

On the 4th there will be an occultation of Saturn by the Moon at 2.27 a.m., or nearly three hours after they have set.

On the 10th Venus will be in inferior conjunction with the Sun on the side of its orbit nearest to the earth and only about 25 million miles from it. It will be lost in the rays of the Sun, with its bright side away from the earth, but not in a direct line with it, being about 8 degrees southward.

On the 11th Psi Aquarii will be occulted at Warwick, between about 6.48 p.m. and 7.28 p.m.

When the Moon rises on the 12th it will be interesting to notice the nearness of the bright planet Jupiter, somewhat higher and to the left of it.

An occultation of Ki Arietis will take place on the 15th, between 4 a.m. and 4.30 a.m. This occultation will take place somewhat earlier and last longer at Rockhampton.

On the 16th the remarkably close conjunction of Mercury and Mars will be barely observable without binoculars or telescope low down in the east, about an hour before sunrise.

Omega Tauri will be occulted on the 17th, between about 3.25 a.m. and 4.10 a.m., in Southern Queensland.

Jupiter will be in opposition to the Sun on the 22nd, and its distance from the earth reduced to about 290 million miles.

On the 23rd the Sun will rise almost directly due east and set due west. An interesting daylight view may be obtained on the 23rd by anyone with keen eyes who can get the Sun shielded off by a building or good dark object, when Venus should be seen not far off to the west and the crescent Moon still further to the north-west. Uranus will be in the constellation Pisces near Jupiter, and Neptune in Leo near Regulus.

4 Oct. ☾ First Quarter 12 1 p.m.  
 11 „ ○ Full Moon 7 14 a.m.  
 18 „ ☾ Last Quarter 12 31 a.m.  
 26 „ ● New Moon 1 37 a.m.

Perigee 11th October, at 1 24 p.m.  
 Apogee 25th October, at 11 48 a.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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# QUEENSLAND AGRICULTURAL JOURNAL

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PART 5.

## Event and Comment.

### Dairying in Australia—Queensland's Prominence.

“QUEENSLAND produces one-fourth of the butter and one-half of the cheese manufactured within the Commonwealth,” said Mr. E. Graham, Under Secretary for Agriculture and Stock, in the course of a notable address at a gathering of representatives of the dairying interests of Australia, at Brisbane on 19th October. Stressing the importance of dairying in our national economy he showed that there are, in all, 149,000 persons engaged directly in the industry in Australia. Their production of butter alone aggregates 340,000,000 pounds per annum, of which 145,000,000 pounds finds a quittance in overseas markets. The value of the industry to the Commonwealth is £32,140,000 per annum, and the capital expended in buildings and plant totals £3,500,000.

Continuing, Mr. Graham said that the dairying industry was well organised in comparison with other sections of the primary production, and this was largely due to the brains and energy of the men present at that gathering. To them the dairying industry owed a deep debt of gratitude. The members of the three boards were not well paid for their services, but they had the satisfaction of knowing that they were accomplishing valuable work of a truly national character. The organisation for which they were responsible was exerting a very great influence on the industry.

It was not only the man who milked the cow who was responsible for the advance in the industry; the butter manufacturer had played an important part, too. The good butter maker was the man who did not spoil good cream in making butter. That showed how important was the work of the manufacturer. In order to compete on a sounder footing against the great dairying countries of the world, it was necessary, he said, for them to strive towards a greater production of butter-fat per cow.



In some countries the average production of butter-fat was considerably higher than in Australia. He realised that the responsibility for an increase of the average rested in a large degree with individual owners of dairy herds. Until they tried to bring about a general improvement in production they would not make much progress in the industry. In Queensland herd-testing was performed without cost to the owners, and he advised them to concentrate on this means of reaching to higher average production.

### **Farming and Grazing—Their Inter-dependence.**

ACCORDING to the Annual Report of the Department of Agriculture, seasonal conditions in the course of the year served to demonstrate more strongly the inter-dependence of the agricultural and pastoral industries of Queensland. The failure once again of the normal wet season in certain of the pastoral areas created an extraordinary demand for farm produce as stock foods, both in bulk and concentrated form. High prices for fodders were the rule, and these, in the circumstances, often far exceeded their true economic value. Graziers in the dry country were faced with the necessity of keeping their stock alive at almost any cost, and this had naturally an important influence on the farming industry. A corollary of this condition and its possible cyclical recurrence is that, in districts suited to agricultural development by modern methods of cultivation, more land will be brought into production and cropped primarily for stock foods.

The dependence of districts of low annual rainfall and restricted water resources on more favoured regions for fodder supplies in dry times became more and more evident in the course of the year. This fact must influence largely agricultural development along the lines of fodder production and conservation, and become no inconsiderable factor in the extension of land settlement in the State.

An example of this inter-relationship of our more important rural industries was provided in the North, where the bulk of the season's maize yield, which approached the million-bushel mark, went to relieve the shortage of sheep feed in the Central-Western areas. The maizegrower experienced the satisfaction of a settled and insistent demand for his grain.

### **Cotton Growing in Queensland—An Adaptable Crop.**

THE cotton grower, in the course of the year, according to the annual Departmental review, met with the most extreme combination of climatic conditions that he has experienced since the revival of the industry in Queensland in 1919. The lightness of winter rains generally made field work both difficult and expensive. Dry conditions continued until the end of September, when light to medium rains occurred over most of the cotton sections. From then on there was practically no more rain until mid-December when precipitations were bountiful and general over the cotton belt. January rainfalls were heavy, amounting to as much as 15 inches for the month in some of the sections. Mid-February was hot and dry, but March was marked with copious rains over nearly the whole of the cotton areas. Later precipitations were lighter. It is obvious, then, that cotton-growing was subjected to a fairly severe test as to its cultivable suitability in inland regions in a wet season.

Results indicate, as a whole, that cotton can be grown with profit in these areas under heavy rainfall conditions.

Experiments and results over the previous five years demonstrated thoroughly the value of cotton as a dry-weather crop. The experiences of the past season indicate certainly that good yields may also be obtained when unusually wet weather rules at critical stages of crop development. It has been shown that the cotton plant will yield well over a series of seasons in the main regions selected for its cultivation in Queensland. It requires but the careful observation of demonstrated methods of cultivation to make cotton-growing a profitable enterprise, bearing favourable comparison with other forms of agriculture conducted in what is called the cotton belt.

### **The Cold Logic of Economical Conditions.**

GENERAL conditions of agriculture are reviewed briefly in the Report. The hard, cold logic of economic conditions, it says, is proving a powerful stimulant to more intensive and extensive co-operative effort. Its general practical application calls for the guidance of leaders of first-rate business acumen. The interests of primary industry call, too, for the abandonment of barren debate (which are, after all, often based upon mere abstractions), and concentration on the application of the principles of better business. This has been done in the sugar industry, the practical economics of which have become the concern of everyone engaged in it and who are benefited by its stabilisation, progress, and profits.

### The Stability of Agriculture.

WE have to regard agriculture allied with animal husbandry as a well-rooted industry (continues the Report), and not as a hand-to-mouth, year-to-year proposition. That suggests the need for the wider adoption of the longer view that leads to the creation of a proper perspective of the economies and general conditions of rural industry, and relieves us from alternating periods of undue elation and undue depression.

From past experience we know that, on the average over a term of years, conditions in Queensland are distinctly favourable to further development, in a vast degree, of our great and extending primary enterprises. In Queensland good farming, though perhaps not spectacularly profitable, is a safe and sound business.

### Advertisement of Adversity—"Bad Business."

THE Report continues: When agriculture meets with economic difficulties through seasonal adversity, or other causes, all the world is told about it; but when other businesses are under the weather financially every effort is made to suppress the fact. Wide advertisement of adversity is, in every calling but farming, regarded as bad business. This psychological contrast, if it can be so termed, leads often to an over-estimation of commercial prosperity and agricultural depression. Taking the longer view, and contrasting it with other callings in which financial mortality is often high in comparison, we come to a clearer appreciation of agriculture as a commercial undertaking.

### The Journal.

A STRONGER popular appeal and a substantially increasing circulation among farmers were particularly notable features of the year's progress of the "Queensland Agricultural Journal" (says the Report). As a publication dealing with the principles and practice of agriculture, both technically and scientifically, it is proving of definite value and is appreciated accordingly. It is accepted as an authority on matters relating to the industry it serves efficiently, not only in Queensland but in other States of the Commonwealth and countries overseas. As a medium for disseminating information of educational and economic importance and working field notes it is highly valued. Officers of the Department engaged in directive and specialised work have been generous in their contributions in regard to their frequency, regularity, and practical value, and their material assistance has enabled the Journal to maintain its high reputation as a useful and authoritative publication.

### An Agricultural Survey.

THE agricultural survey of Queensland, which is being made with the object of ascertaining definitely and comprehensively, among other things, the character, location, and extent of the various types of soils throughout the State, will take some years to complete, but the Minister for Agriculture and Stock, Mr. W. Forgan Smith, informed the Press recently that the information which, from time to time, was obtained would be available for practical application.

Mr. Forgan Smith said that, in addition to the study of soils, information was being obtained as to climatic conditions, rainfall, temperatures, present vegetation, insect life, and facilities for marketing produce in the districts under review.

The committee first met in February, and on 20th April four field officers—an agricultural instructor, an agricultural chemist with knowledge of geology, a botanist, and an entomologist—set out on a preliminary survey, commencing in the neighbourhood of Flaggy Rock Creek, which was 66 miles south of Mackay, and covering the ground on the coastal side of the range as far as Sarina and the Bolingbroke country on the Connors Range.

Preliminary reports were submitted, and at present the Agricultural Chemist, in company with an officer with a knowledge of surveying, was making a more detailed survey of the Bolingbroke country on the western slopes of the Connors Range.

It was recognised that it would be some years before this survey of the State was completed, but from time to time, as definite information became available, it was thought that much of the agricultural produce now imported could be grown within the State as a result of the knowledge so obtained. There certainly would be on record more definite and accurate information relative to the agricultural possibilities and the future prospects of development of the State.



# Bureau of Sugar Experiment Stations.

## UBA CANE.

By NORMAN BENNETT, Travelling Scholar.

*The Director of the Bureau, Mr. H. T. Easterby, has received the following report on Uba Cane from Mr. Norman Bennett, the Travelling Sugar Technology Scholar:—*

### Report on Uba Cane—Milling and Payment.

To date, the growing of Uba cane has been confined to those countries where the search for better varieties has been unsuccessful—e.g., South Africa—or in those countries where the existing varieties have been subjected to severe attacks of Mosaic disease, and Porto Rico.

The resistability of Uba cane to Mosaic disease is well recognised, and due to this one property the planting of other canes has been entirely prohibited in South Africa. In Porto Rico and in some of the West Indian Islands, Uba cane was introduced to check the spread of Mosaic disease, but recently the acreage of Uba planted has been reduced, due to introduction of other varieties less resistant to Mosaic but more suitable as regards sugar content and milling conditions than Uba.

The milling of Uba cane has always been attended by considerable difficulty due to the very high fibre content, and also to the high ratio between hard, tough rind and soft pith. Owing to the high fibre tonnage ratio, mill settings have to be widened and extra power (as high as 25 per cent. over softer fibred varieties) is required at the milling station proper so that creditable extraction figures can be maintained. The treatment of Uba cane in a mill set to grind normal canes would result in decreased tonnage and decreased extraction.

Consequently, for best results, it would be preferable to set aside a particular period of the grinding season for the treatment of this cane in order that the mill engineer could adjust his mills to the new conditions and maintain these adjustments during the period of Uba grinding. I am fully aware of the difficulties which would thus arise, but am of the opinion that this is the only efficient method when considerable tonnage of the cane has to be treated.

Under normal conditions in those countries treating Uba cane, the milling equipment consists of some type of crusher or combination of ordinary crusher followed by a shredding device. For the treatment of such hard-fibred varieties as Uba, such a preparatory equipment is essential for obtaining results.

### The Cane under Queensland Conditions.

Under Queensland conditions, the milling of Uba cane would be handicapped owing to the following factors:—*Firstly*: It is almost an impossibility, under present conditions, to have cane cut for delivery to the mill in trashless condition. With such a cane as Uba, which retains its leaf sheath firmly, cane delivered to the mill would contain an additional fibre content adversely affecting milling results. *Secondly*: The usual type of shredding device used in Queensland mills is better adapted to the softer-fibred varieties of cane, such as Badila and Goru. Where the rind of the cane is hard and tough, this type of shredder (as I saw it working in Java on B. 247) has no definite shredding action; the results are more like those of tearing the cane into long strips entirely unsuited to the maceration bath system used subsequently in Queensland conditions of milling.

This type of shredder was abandoned in Cuba due to incessant belt trouble when dealing with the hard-rinded Crystallina.

In addition to milling problems introduced in treating Uba cane, further difficulty arises owing to the refractability of Uba juice to ordinary methods of treatment under the lime defecation process. This difficulty is well recognised as being due to the high percentage of gums and waxes, and recent research in South Africa has shown the possibility of extra difficulty arising due to the presence of starch, especially in under-ripe canes.

In ordinary methods of lime defecation, the treatment of Uba juice entails increased settler capacity and, in those factories which do not return muds to the mills, additional filter press area. In South Africa, where Uba is the main variety,

the factories are equipped with some type of sulphitation plant in order to assist in removing the settling difficulties always present when the process of defecation alone is used.

Recoveries with Uba juice, based upon recognised formulæ for recovery of sucrose entering manufacture, are always lower than the theoretical value. To my knowledge, there is no system of cane payment which resembles that used by Queensland Cane Prices Board. Generally, a flat rate is fixed by the miller in such a manner as to allow a considerable margin to cover low recoveries on the poorer classes of cane. I understand that some system for cane payment has been introduced into South Africa; the scheme is based upon Queensland practice, but I have no definite details of the scheme. As its application is directed towards conditions where Uba cane is the main variety under treatment, further inquiry might be of considerable value in determining a set of factors applicable to the treatment of Uba cane under Queensland conditions.

In a few isolated instances where a payment scheme is in use, the methods of calculation are based upon two sets of determined figures. The first figure is the "normal juice extraction" and is based upon calculations made from the weights of cane and maceration water together with the Brix analysis of the "first expressed juice" entering manufacture.

A Brix factor for the normal juice is obtained under conditions of dry milling.

$$\text{Brix factor} = \frac{\text{Brix of mixed juice under dry milling}}{\text{Brix first expressed juice}}$$

By determination of this factor at regular intervals, factors for the mill train are obtained that correct variations due to variety of cane, &c.

Using this factor, the Brix of the normal juice is determined from that of the first expressed juice. The next calculation comes from the weight of mixed juice entering manufacture.

$$\frac{\text{Weight of mixed juice} \times \text{Brix of mixed juice}}{\text{Brix of used juice}} = \text{Weight of used juice}$$

$$\text{and } \frac{\text{Weight of used juice}}{\text{Weight of cane}} = \text{Normal juice extract.}$$

In some instances, the daily or weekly averages are taken from this figure and applied to all cane furnished during the period. In others, a flat figure (varying from 75 to 82 per cent.) is taken.

For the sucrose calculation

$$\frac{\text{Brix used juice} \times \text{average mixed juice}}{\text{Purity for period}} = \text{Sucrose in used juice.}$$

This is made on the assumption that the purity of the used juice is equal to that of the expressed juice entering manufacture.

$$\text{Finally sucrose recoverable} = \text{Weight of sucrose in used juice} \left( 1.4 - \frac{40}{\text{Purity}} \right)$$

This method is well known and described in Spenser's "Handbook." In actual practice the method gives satisfactory results when a factory for Boiling House Efficiency—

$$\text{i.e. } \frac{\text{Actual yield}}{\text{Theoretical}}$$

—is applied for any particular factor and determined at regular intervals during the season to correct for seasonal variations and differing methods of manufacture.

As our Queensland factories make no attempt to weigh the juice entering manufacture, such a system is inapplicable, and any scheme for the payment of Uba cane would have to be considered on actual results obtained by some average Queensland factory which has ground Uba cane solely for a period long enough for the data obtained to be of value. The application of the present formula used in Queensland for cane payments for such a cane as Uba would be, to some extent, unfair to the millowner in view of the increased difficulties in milling and manufacture.

The most equitable scheme would be to obtain data from some South African factories and also from Fairymead, and to base a separate scale on these figures for such a time as additional data is obtained upon our own Queensland factories.



In Jamaica, the question of further plantings of Uba cane has been under serious consideration. Quoting from the "Indian Sugar Journal" of May, 1927, page 241, "There appears to be no great danger of many planters adopting the cane permanently if they can grow canes of a better class. The little or no cultivation required, the heavy yield under unfavourable conditions, and the freedom from disease are all in its favour; whilst its fibrous nature, less juice, difficulty in harvesting and milling are on the other side."

For Queensland conditions, it would be inadvisable to grow Uba cane except on those lands where the sugar yields per acre per year are considerably lower than those with other varieties. In such cases, permission to plant the Uba cane should be modified by the condition that—

- (1) Sufficient poor land be planted to furnish cane for a reasonable grinding period.
- (2) Such cane to be harvested at one time and subject to agreement between growers and millers.
- (3) Adequate consideration be taken in fixing the price of cane so that all increased costs of milling, manufacture, and additional equipment necessary to handle the cane be provided for.

## HINTS ON ENTOMOLOGY TO CANEGROWERS.

By EDMUND JARVIS, Entomologist.

### How to Identify and Control "Army Caterpillars."

During last month (September), larvæ of the common "Army Worm" (*Cirphis unipuncta* Haw.) caused considerable injury to young shoots of plant and ratoon cane in certain localities.

Having been very plentiful this season, growers are advised to look out for caterpillars comprising the second brood, which quite possibly may appear during October in formidable numbers. The occurrence of climatic conditions unfavourable to normal development of the chief parasitic or predaceous enemies of this cane pest are probably largely responsible for such outbreaks. In the case of serious infestations amongst young plants from twelve to eighteen inches high, prompt action should be taken when first chancing to notice the heart-leaves partially devoured, and pellets of excreta from the caterpillars lying between them and around the base of affected shoots. Should the caterpillars prove to be small or only half grown ( $\frac{3}{4}$  of an inch long) every leaf may soon be devoured, and plant growth severely checked.

Larvæ of this noctuid moth are striped lengthwise, the fully grown caterpillar—which measures from 1 to 1½ inches long—varying in general colouration from light greenish-yellow to greenish-black. It has three stripes along the sides, the middle one dark and the other two of lighter colour; while along the centre of the back is a narrow white broken stripe, most noticeable behind the head and along the tail-end. Head, greenish-brown, blotched with dark grey or black. Under surface of body, between legs lighter than the back, and more or less mottled.

Eggs of the earlier broods of moths are often laid on rankly-growing grasses in damp, or low-lying situations, from whence the swarms of caterpillars, after having quickly eaten surrounding herbage, &c., travel forward in search of fresh fields to destroy. When an army chances to be of vast dimensions its progress can sometimes be stopped by ploughing deep furrows in front of the line of march taken up by the advancing host of caterpillars; in which case they can be easily captured in holes dug in the bottom of such furrows or trenches, and killed in wholesale numbers.

Ordinary outbreaks can generally be effectively controlled by spraying the cane leaves with lead arsenate, in such manner as to form a poisoned strip or band of about two or three cane rows wide immediately in front of the line of advance. Use 2 lb. of lead arsenate in about 50 gallons of water, taking care to keep the mixture well agitated while syringing it over the leaves, in order to ensure and maintain uniform suspension of this arsenical in the water. In cases of scattered infestation, spray the area affected. Another good remedy is to mix up a poison-bait (1 lb. Paris green thoroughly incorporated with 20 lb. of bran, to which is then added 2 quarts of molasses dissolved in sufficient water to reduce the bait to a thick crumbling mass). Sprinkle pieces about the size of a walnut amongst affected cane rows shortly before sundown.

**Large Moth Borer in Evidence.**

When 10 per cent. of the shoots of young ratoon or plant cane is found to be attacked all shoots showing "dead hearts" should be cut out, taking care to sever the shoots at a point about  $2\frac{1}{2}$  inches below ground level. These must be burnt or crushed to destroy any caterpillars or pupæ. In many cases some of the "dead hearts" collected will have been caused by caterpillars of the "Moth Shoot Borer, *Polyocha* sp., which, together with those of the Tineid Moth Borer (*Ephysterus chersæa* Meyr.), are often responsible for death of the heart leaves of young cane shoots.

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**CANE PESTS AND DISEASES.**

*The Assistant to Pathologist (Mr. E. J. F. Wood, B.Sc.) has made the following report to the Director of Sugar Experiment Stations, Mr. H. T. Easterby, on the Babinda district, from 22nd to 30th September:—*

Leaf Scald and Spindle Top are widespread throughout the area, though in the case of the former disease the infection is, on the whole, light. Out of fifty farms visited, every one showed Leaf Scald to some extent in every field, and in passing other farms on the "jigger" I did not notice one free from the disease.

The area in which the infection is lightest is Bartle Frere, especially the western end. Here, generally speaking, there are only a few diseased stools in each field, and this is the cleanest place for farmers to buy plants. If those in this area observe carefully to dig out every diseased stool, they will soon have a clean area—at least as far as Leaf Scald is concerned.

Russell River, especially the southern bank, is far otherwise, and some heavy infections were seen both in the Queensland National Bank Estate region and the region opposite Bucklands. Even on the Bucklands road there is fairly heavy infection on some farms.

No. 67 shows slight traces of the disease. In all these places Badila is the main variety grown, but as we approach Pawngilly and Miriwinni there is an increase in the proportion of Clark's Seedling and the Gorus, both of which show serious affection in the acute stage. Reid's Branch, too, shows infection in Badila.

East Russell has a large percentage of Gorus and Clark's Seedling; the disease is very evident, and the losses must be considerable. The same remarks apply to Frenchman Creek, Palma, Harvey Creek, Bellenden Ker, and Cucania.

I unhesitatingly suggest that the Gorus should be put on the prohibited list for this area, and that consideration be given to the prohibition of Clark's Seedling, as Goondi has done, in connection with this disease. In the meantime I urge the farmers to discontinue the planting of these varieties, as they are merely serving as foci for infection of our staple northern cane, Badila. We should be taking all the pains we can to conserve this variety, instead of which we are not taking any precautions to keep it free from disease, let alone to improve the variety. The fact is deplorable when we consider how dependent we are on Badila, which is one of the world's finest canes in suitable locations.

Q. 813 seems to do well if planted late, and should do well on soils which are not suited to Badila, but only on those. It is apparently rather resistant to Leaf Scald, though it has not been tested sufficiently to give us any definite data. Being inclined to lodge, it should not be planted before August. It is a good ratoon, and has usually a good c.c.s. E.K. 28 might also be tried, but I have no evidence of its resistance to Leaf Scald. I should imagine it to be fairly susceptible from its susceptibility to other diseases.

Spindle Top has caused the trash to adhere to the canes, and the adventitious roots have sprouted, firmly binding it thereto. This has worried a number of farmers, but is probably due in part to the cyclonic disturbance at the beginning of the year. It is especially bad in the Bartle Frere area, and this unfortunate fact minimises the advantage of the freedom of this area from Leaf Scald. However, it is not confined to this place, but also occurs fairly badly on every farm visited, in Badila, H.Q. 426, and Q. 813. Of course, it is especially bad in grubby areas. The prevalence of this trouble makes it imperative that a change of seed be obtained as soon as possible from such a place as the Tableland, and efforts should be made to arrange this and also for the distribution in the Babinda area. I have prepared samples of Leaf Scald and Spindle Top for the mill, and farmers whom I have not visited can see them there.



*The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report from the Assistant to Pathologist (Mr. E. J. F. Wood, B.Sc.) for August and September:—*

### INNISFAIL.

Two diseases are in need of attention in this area—Leaf Scald and Spindle Top. Leaf Scald has been described in my previous reports, and has been dealt with in Mr. D. S. North's bulletin. The carrying out of the recommendations I have made will control the disease. Just at present it is not showing up to its full extent in some areas, and the Colonial Sugar Refining Company's pathologist at Goondi (Mr. Trivett) finds it difficult to detect just now. The Innifail Estate, which I am told suffers badly, seems now fairly clean, though stools were observed there which showed the disease. Goondi, however, seems the cleanest area, though Scald was seen at Darradgee, Upper Darradgee, Garradunga, Eubenangee, Sundown, Goondi itself, and Mundoo.

South Johnstone is the worst infected, and in all the H.Q. 426 and Goru the losses are considerable. Around Basilisk, Miskin's Siding, Nos. 1 and 2 Branches there are some badly diseased fields of Badila, and at Jappoon, between this place and Silkwood, No. 3 Branch and No. 5 show far too much of this disease. As a district Silkwood and No. 4 form the worst centre of infection that I have yet seen, and on one field of young plant H.Q. 426 many of the plants are quite dead, while others are showing the chlorotic stages. The field will probably have to be ploughed out before harvesting. This is the state of things we arrive at by neglecting the selection of seed. This area shows the necessity of a field officer attached to the mill with the duty of controlling the planting. The sooner this state of things comes about the better.

Mourilyan has its share, though the infection is lighter than at South Johnstone. Liverpool Creek, which was the worst area, has been cleaned up and the worst fields ploughed out. The disease is still present on almost every field, but to a very limited extent, and the time for digging out the affected stools is at hand. If this is done the disease should be completely controlled. Sandy Pocket, Rafa, Boogan, Moresby, Mourilyan, and the Harbour line all show the disease, and on at least one farm at Mourilyan the trouble is epidemic in Badila and H.Q. 426.

The disease is in the chronic stages in Badila and Pompey, and in the acute in H.Q. 426. These two latter canes should, in my opinion, be discontinued owing to their susceptibility, and as the returns from Pompey are, as far as I can gather, very poor, there seems no reason for its retention. As for Badila we must try to select the seed and to introduce some new strains.

### Spindle Top.

This name for the disease, for which we have to thank Mr. A. P. Gibson, is rather a fortuitous one, as the main symptom is a rapid thinning out of the top of the cane stick. An alternative name, which is also apt, is Needle Top. It is well to have a popular name (for Pink Sclerotial Disease of the leaf sheath is a mouthful and means nothing to the farmers) to distinguish this trouble from Top Rot, which it superficially resembles. The reddening of the leaf sheaths is characteristic of the disease, and the cane becomes trashbound. The black fruiting bodies of the causative fungus can usually be seen when the sheaths are pulled apart.

That the trouble is due to a fungus of the sclerotial type is known, but much research remains to be done before we can give a definite statement regarding this trouble. This fungus binds the upper leaf sheaths, and chokes the stem and growing point of the cane, which in time will die, and the cane will often rot. The rot is secondary, and it is strangulation that causes death.

This year the disease is widespread, and is causing losses which have in some cases been estimated at over five tons per acre. On most farms quite a percentage of the sticks in each stool are dead or affected, and, in many places, whole patches and whole stools are dead. I am told that the disease is rarely as severe as at present, and it is considered that the flood and cyclone at the beginning of the year have had a great deal to do with it. Areas which have been flooded, or which are affected with grubs, show the disease in all its virulence, and it is usually thought that it is due to a primary check in growth. It seems certain that the weather is a determining factor in the occurrence of the disease, as is probably the case with most of our troubles.

I do not know of any experiments which have been carried out in connection with the transmission, but we can make some pretty sound assumptions. The fact that the sclerotia cling to the leaf sheaths and have been seen clinging to the

rind of the cane, shows us that it can be carried with plants into fields which were previously unaffected. It will also be present on the trash left on the field after cutting.

Now, these facts lead us to the obvious conclusions that plan selection will be a control measure, and so I suggest that all canes showing the disease (these are usually red in contrast to the black of healthy Badila) be rejected when planting.

Secondly, the burning of trash is a control measure where the disease is severe, but this is a matter of compromise, for there are great benefits to be derived from the ploughing in of trash. In cases where the percentage of infection is high I recommend that the trash be burnt, but in other cases it is a matter for the discretion of the farmer.

A third measure which the nature of the disease suggests is the disinfection of plants, but experiments will have to be conducted before any recommendations can be put forward.

As Badila is the principal cane infected, and is also the staple variety of the North, it is important that some investigations should be made of the diseases which affect it, and also that the most promising of our seedling canes be tried out under supervision in order to have some tested varieties to fall back on in case of need.

Subsidiary factors which may affect this disease are grubs, drought, flood or cyclonic weather, sodden ground, bad tilth, or bad soil conditions due to impoverishment of the soil.

I do not believe in the promiscuous distribution of varieties, but the planting of trials under supervision will enable us to select one or two which will have desirable qualities, and will be worth propagation on a field scale.

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*The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report from the Southern Assistant Entomologist, Mr. R. W. Mungomery, of investigations for the month September-October, 1927.*

#### **Effect of "Stinking Roger" (*Tagetes grandulifer*).**

Several plants growing in different parts of the world are known to possess poisonous properties, which can be utilised by man in his attack on the insect forces. Powdered hellebore root which contains a poisonous alkaloid, and pyrethrum flowers which give off poisonous vapours are well known examples. Most probably with the above facts in mind, many of our more observant farmers have credited the common weed "Stinking Roger" with the possession of similar properties, asserting that it is actually instrumental in killing cane grubs. Those who have knowledge of this weed will easily understand how this assumption has been made and so widely circulated. "Stinking Roger," well known in the southern districts, possesses a distinct odour, and also certain urticating properties, which are, at times certainly very unpleasant to man. Irritation from this source is often experienced by the uninitiated during hot sunny weather, when scarifying in cane where this weed is growing. As the implement is dragged along the cane rows, the leaves of the weed brush against the backs of the hands. This produces a reddening of the more tender portions of the skin with an accompanying painful itch. Moreover, one often hears of instances where this weed has been growing prolifically and grub damage has been unknown, and this together with its other well known properties has probably had the tendency to become a kind of folk-lore. In certain districts, therefore, there now remains a belief that where "Stinking Roger" grows, no grub damage occurs. In this manner a kind of half-truth has been accepted and made a general rule.

That this is incorrect was proved by field evidence in the Mount Jukes area of the Mackay district, where the grub damage witnessed by the writer during the past two seasons has been of a severe nature, and there this weed comes very much into prominence in the canefields. In this district, at least, there is no faith in "Stinking Roger" ever proving the salvation of their grub-infested crops.

As most popular beliefs usually have some element of truth for their foundations, it was thought that this matter warranted closer investigation with a view of gaining more knowledge of this weed in its relationship to cane grubs. Experiments were accordingly carried out at the Bundaberg Laboratory.

In the first series of experiments, the leaves of the plant were chopped up finely and mixed with soil in cages, and a cane grub (*L. trichosterna*) was placed in each



cage. In another case the flowers and young seeds were used in a similar manner, but in no case did the grub show any signs of weakening or flaccidity which usually precedes death. This result was obtained even though the earth in the cages smelt strongly of the essential oils which so characterise this weed.

A second series of experiments was later conducted in which "furfuracea" cane grubs were used throughout the tests. On examining the cages after they had been set up a few days, some of these grubs were found in the act of eating these leaves, upon which they apparently thrived, for they seemed quite as healthy and normal at the conclusion of the experiment as at the beginning. As a crucial test, this weed was pounded up in a mortar and the juice was extracted from it. Each grub was then completely immersed in this juice for a few seconds and later transferred to cages containing moist soil, but it was found that this in no way inconvenienced the grubs, and results from these tests were equally convincing that the weed possessed no insecticidal properties as far as two of our worst cane grubs were concerned.

This experiment confirmed previous experimental work carried out by Mr. Jarvis with "Stinking Roger," but in his case cane grubs of the "greyback" beetle were used. However, this was not the primary object in view, for it was thought possible that with our southern grubs representing different species of different genera, results might vary somewhat. Thus the experiment was repeated using our southern cane grubs, but the results coincided with Mr. Jarvis's findings. He showed that "cane grubs have a decided liking for leaves of this weed." In this way, it is highly probable that when this weed is ploughed under grubs will feed on it, and not be forced to turn their attentions to the cane stools, and this would serve to explain how some cane crops suffer less when this weed has been growing on cultivated land. Whether it is effective in warding off ovipositing beetles still remains an open question, but from experience at Mount Jukes there seems little to support this contention.

### Effect of Subsoiling.

It is the custom on several of the larger plantations in the Bundaberg district to carry out subsoiling operations after cane has been ploughed out and previous to the planting of another crop. From an entomological viewpoint, this should be carried out during the months of September and October in order to gain the utmost of an advantage which this system possesses over ordinary ploughing. During these months cane grubs which are about to turn into beetles and emerge in the following November or December are either in the helpless prepupal stage or have already turned into pupae. Both of these are located in nicely fashioned earthen cells, at an average depth of about 15 inches, so that the ordinary plough generally skims over the top of them. However, when the tines of the subsoiler pass through the soil they usually crush or break these cells. If the cell be crushed the grub or pupa naturally suffers a similar fate, but if the cell be merely broken or disturbed, the surrounding soil falls into it. In this latter case the grub is too helpless to make another cell for itself and further, both it and the pupa (whichever the case may be) are then unable to cast off their skin when passing into the succeeding stage, with the result that the insect emerges a cripple. Thus, by preventing the emergence of beetles which are likely to reinfest the same fields, the practice of subsoiling carried out during the above-mentioned period has far-reaching effects.

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*The Director of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report from the Assistant to Entomologist, Mr. G. Bates, on the Pialba and Nambour Districts.*

### PIALBA.

This district was visited during the early part of August and was found at that time to be free of any serious insect damage. However, despite this, certain insects are at times responsible for injury to cane on individual farms, wireworms being the chief source of annoyance.

Wireworms are larvæ of Click Beetles, belonging to the family Elateridae. These beetles are often seen around the lamps during the summer months, and can be recognised by their habit, when turned on their back, of jumping upward and landing right side up. The larvæ (or wireworms) can be recognised as being

cylindrical, body shining yellow in colour, with a dark-brown head. They vary greatly in size, but when brought under the notice of the growers by damaging cane, are then from 1 to 1½ inches in length. They live underground and cause injury to cane by eating the eyes of sets and chewing through the base of the young shoots. From information gathered it appears that the bulk of damage is occasioned during August, due most probably to the fact that a large portion of the planting is done during that month, and perhaps owing to weather conditions, as the sets do not strike as quickly as those planted later in the year, thus giving the wireworms every chance to attack them and destroy the eyes. At the time of my visit practically no land had been planted up, so that up to the present little damage had been reported this year, but is likely to occur to cane planted during the present month or later.

As the life history of these particular wireworms has never been worked out or studied in detail, no definite basis of control can be laid down, but growers can tend to minimise the damage by thorough cultivation and the use of good healthy plants, thus giving the crop a start without any undue handicap. Wireworms are plentiful in land growing *paspalum* and other grasses, and when these lands are given two shallow ploughings and planted up, the grower is simply courting trouble. Poor cultivation and the use of inferior plants is in itself sufficient to cause a poor strike, sets lying a long time in the soil without germinating, and then throwing sickly and slow-growing shoots, and it is in places such as these that wireworms cause considerable damage, for when shoots are eaten off the plant has insufficient stamina to throw another from the base of the injured one.

### Moth Borers (*Phragmatiphla truncata*).

The caterpillars of this insect which tunnel the sticks of large cane and the shoots of young ratoons are to be found on practically every farm in the Pialba district to a greater or lesser degree. They are particularly noticeable along headlands and where cane has been allowed to become weedy. The prevalence of this insect in the Pialba district this year is probably due to the fact that owing to weather conditions, which made clean cultivation impossible, cane became weedy and headlands overgrown, thus giving rise to ideal conditions for the breeding of this pest.

### The Black Beetle.

Several growers complain of injury to young cane by a species of beetle commonly referred to amongst themselves as the "Black Beetle," and which is known to science as *Pentodon australis*. The damage by this beetle is similar to that caused by wireworms, the beetle chewing the eyes of sets and young shoots, as well as burrowing into the set itself. Injury by this beetle has not been so noticeable during the past two years as formerly, and so far this year no damage has been recorded.

### Grubs.

Third stage grubs of an undetermined species of Scarab beetle were found damaging ratoon cane in red soil in one portion of the district. The grower has not had any damage previously, and this year it is not serious, only a few stools being eaten, so that this species cannot as yet be classed as a serious cane pest.

Grubs of the Christmas beetle (*Anoplognathus boisduvali*), and *Dasygnathus australis-dejeani*, were found under cane and in cane land, but not in sufficient numbers to be capable of causing appreciable injury to cane.

## NAMBOUR.

### Grubs.

"White Grubs" are to be found in all parts of the Nambour district, and at times are responsible for more or less serious damage. Ratoon cane is not injured to any extent, the damage being mainly confined to young plant. The grubs attack the sets as soon as they are planted, eating the eyes and young roots, besides chewing into the set itself.

While there are several species of white grubs to be found in cane land in this district, the most common are those of the Christmas beetle (*Anoplognathus boisduvali* Boisd.). They are particularly plentiful in *paspalum* land, and for that reason are known to most of the farmers as the "Paspalum Grub." When this land is broken up and cane planted without first thoroughly cultivating the soil,



damage is most likely to occur, and although grubs of the Christmas beetle are not such voracious feeders as some of the other well-known cane beetle grubs, they are, given suitable conditions, capable of causing considerable damage. So far this year the damage has been slight and growers remark about the scarcity of grubs seen while ploughing, and some of them attribute this to the heavy rain which fell towards the latter end of last year, when the ground became waterlogged, and grubs could be seen floating about and lying dead on the surface of the ground.

#### **The Black Beetle (*Pentodon australis* Blk.).**

This is another insect pest of the Nambour district and one with which most growers are familiar. It is capable of doing considerable damage to young plant cane, and was troublesome in certain parts of the district about two years ago. Since then the losses caused have not been serious, and so far this year no damage at all has been recorded. The beetle often flies to light and is plentiful in paspalum land.

#### **Moth Borers (*Phragmatiphila truncata* Walk.).**

This insect is to be found on practically every farm, and with the exception of a couple of instances is only responsible for minor damage. This is mainly confined to headlands, and except where cane is required for plants, very little damage is done. The presence of a small Braconid wasp, which is parasitic on the larva of the moth borer, is a big factor in keeping this insect in check.

#### **Rats.**

The depredation of rodents is to be seen in several parts of the district, chiefly on the low-lying country towards the junction of Petrie Creek and Maroochy River, also in one or two places on the river. The damage caused at present is not alarming, but could easily become so, and growers would be well advised to keep them under control by spreading poison and destroying the undergrowth that harbours them. Ripe bananas, poisoned with strychnine, is said to give splendid results and may be worth a trial.

#### **Redbills or Water Hens.**

These birds are sometimes responsible for damage to cane similar to that caused by rats, except that they leave the internodes more shredded, whereas the rats make a more or less clean wound.

### **MARYBOROUGH AND MOUNT BAUPLE.**

A few days were spent in these districts towards the end of August, and at that time they were found to be free of any damage by insects, the farmers being more concerned with losses from diseases.

Moth Borers (*P. truncata* Walk.) and Mealy Bugs (*Pseudococcus calceolariae* Mask.) were the only insects seen in any numbers, and these were only doing minor damage that does not call for any control measures. Crickets were also found in cane land and were, in one instance, reported to occasionally damage young cane.

Other minor pests such as Mealy Bugs (*Pseudococcus* sp.), Leafy Hoppers (*P. saccharicida*), and Aphis sp., were found in small numbers in several parts of the district. These would, in all probability be more numerous during the warmer months of the year.

#### **EVERY PRODUCER SHOULD TAKE THE JOURNAL.**

Thus a Grandchester farmer (20-9-27): "I am enclosing herewith postal note for amount of 4s. for which kindly forward the 'Queensland Agricultural Journal' for four years. This Journal should be in the hands of all producers, whether experienced or otherwise, for in every issue there is a fund of information that is beneficial to either."

## FIELD REPORTS.

*The Northern Field Assistant, Mr. A. P. Gibson, reports (3rd October, 1927):—*

### INNISFAIL.

#### Goondi.

This mill does not depend on the Government railroad for the transport of its cane supply or the getting-away of its sugar; the latter is wholly removed by several small floaters which steam up the Johnstone River to the factory and take away upwards of 270 tons of sugar per trip direct to Cairns. The factory is expected to crush some 158,000 tons of cane; it has had a good run and is treating big weekly tonnages, and speedily clearing its area of millable cane. Harvesting is about up to expectations. Some neglected fields were noted; these are generally a menace to the surrounding good ones.

Badila (N.G. 15) and Pompey (7 R. 428) are the varieties grown. The latter cannot be classified among the good varieties; besides being rather low in quality, it is becoming highly susceptible to most diseases. This cane is sometimes recommended for the poorer soil. It, however, is too frequently grown on our better lands. The area planted to this kind is fortunately being rapidly decreased, and that of Badila increased. Some of the undulating volcanic red soil areas more recently planted with cane and yet stumpy are being cleared in readiness for the plough. Working soils (especially the clayey kinds) when overwet upsets the physical condition. Although this is generally known, yet it is frequently done, as otherwise the whole routine of field work would be delayed. Areas tilled when wet may be detected easily; generally they are very lumpy and appear dry. Some farmers roll the trash in ratoons and plough in when turning out the old stubble; others burn everything. The make-up of the trash is mainly derived from the soil, air, and water, therefore the soil is naturally enriched when this is returned to it. It is sometimes very necessary to destroy trash by burning in order to control destructive pests and fungi. Tractors, big and small, wheel and caterpillar action, are going their hardest, drawing various makes of implements suitable for all classes of field culture.

Stools of Leaf Scald disease and Spindle Top were noted throughout the area; the latter is too prevalent and is responsible for big annual losses. This is occasioned by a fungus which binds the sheath to stems—generally one or two canes are troubled; whole stools, however, frequently perish from the effects. The non-planting of such canes and trash-burning would help to control this fungus. Smothered canes or those having had their growth checked invariably are affected. The growing tendency is to place Badila seed too close, which is responsible for cramping, smothering, and probable increase of Spindle Top.

Weevil borers were very active in parts. This is probably sugar's second greatest pest; its spread might be arrested by the Tachinid fly—one of its known parasites—clean fields, and more careful plant selection.

#### Mourilyan.

The value of efficiency in field and factory is being more understood; this is of paramount importance and should ever be our goal.

*Improvements.*—The efficiency of the local mill has been raised remarkably since the installation of larger and more powerful crushers. When the boiling-house has been enlarged and modernised few mills in Queensland will be superior.

*Milling.*—The factory is working well and treating its greatest crop in record time. One thousand two hundred and thirty-five tons of cane were milled during the twenty-four hours ending 4 p.m., 9th September. The weekly mill average c.c.s. is excellent, being 15.95 per cent. Some 6.4 tons of cane are used to make a ton of sugar. Eighty-six thousand tons had passed between the rollers, just over one-half of the crop estimated. Under 3 per cent. of the cane being crushed is burnt by permission. When the factory was visited the management were worried, as it was obvious that the mill must soon cease operations unless some of its stored sugar was removed. Three thousand tons of bagged sugar were stacked under the mill roof, where it is likely to deteriorate; extra labour was needed to stack much of this. The weekly output of sugar is now over 900 tons; this has been gradually accumulating. It seems very evident that the number of ships visiting this port is inadequate to remove the district's ever-growing annual supply of manufactured sugar. What would the position have been had the South Johnstone Mill been crushing normally?



*Crops.*—Crops looked remarkably well, and continue to grow slowly. They appear to have about reached the degree of excellence so far as quality is concerned, and are harvesting quite up to early expectations.

Chief among the varieties grown is Badila (N.G. 15). Of this kind there is about 99 per cent. It is gratifying to note that the management is endeavouring to eliminate Pompey (7 R. 428), a cane generally low in quality and purity. The following is what they have to say about it in a circular recently issued to its growers:—

“Already 1,000 tons of this kind have been milled. The average c.e.s. of the plant has been 8.9 per cent., that of ratoons 10.65 per cent. The minimum c.e.s. was 7.05 per cent., the maximum 10.9 per cent. In addition to the low c.e.s., the purity of the juice is also low. As a comparison with Badila treated to the same time, the following figures may serve to explain further the unprofitableness of growing this variety:—

With sugar at £21 1s. per ton—

Pompey (7 R. 428), plant 8.99 c.e.s.—19s. 6½d. per ton.

Pompey (7 R. 428), ratoons 10.65 c.e.s.—26s. 1¼d. per ton.

Badila, plant and ratoons, 13.65 c.e.s.—37s. 4¼d. per ton.

If the growers are wise they will refrain from the further planting of this kind. A small apparently healthy patch of B. 208 was observed growing on a brown porous soil at Moresby, and in growth somewhat surpassed that of Badila and H.Q. 426 interplanted amongst it.

*Field Work.*—Great activity prevails on most farms; the weather is perfect for all outside operations. Tractors are wonderful helpers in speeding up this class of work. Trash dry and of a medium thickness was being successfully ploughed under by a tractor-drawn Saunders plough. Fields harvested some ten weeks ago had been improperly cultivated and replanted. Many of the old stubbles had not been ploughed out, and what had been lay thickly over the area. The former frequently serves to carry on a disease, the latter hampering considerably all subsequent cultivation.

Different kinds of manures at different rates are being applied to the plant and ratoon crops. Coral from the shores of nearby islands is being pulverised and boated over to the mainland for use as lime in the sugar fields. Flue dust is being broadcasted over some of the adjacent mill farms. This dust is likely to contain much potash, especially that taken from mills burning most of their molasses.

*Diseases.*—Leaf Scald, Spindle Top, Weevil borer, big moth borer, tineid moth borer, and rats are responsible for more or less damage throughout the area. Farmers should get to know these pests and diseases, and refrain from planting affected canes.

### South Johnstone.

The question of the moment is how much of the big 1927 crop will be harvested; this of course is dependent on subsequent weather and period of crushing. At present it is obvious that a large area will remain uncut; big crops of matured cane when left over generally grow heavy, tumble, become rank, and greatly injured by weather and vermin.

*Grinding.*—This is the time when the cane possesses its maximum amount of sugar, when the weather is generally at its best, and when all factories go their hardest—many even work overtime in consequence.

*Crops.*—The almost rainless weather this and last month has now retarded the crop growth and has immensely benefited the outlook from a sugar point of view.

Small, apparently unfruitful patches were again met with in the porous volcanic red soils; such a condition may easily be distinguished by the absence of chlorophyll (green matter) of leaves. This points rather to the probable deficiency of food or foods, possibly potash.

### Silkwood.

*Diseases.*—Leaf Scald is too prevalent in this area, being severe in most varieties grown. The eradication of the Goru family, the growth of less H.Q. 426, more Badila, and the use of disease-free seed is urgently recommended. Gum-like streaks were found in H.Q. 426 at Silkwood. Cutting plants by contract is not a good idea—anything that will help to fill up a bag is frequently classified as a plant by the contractor. It would be difficult to find fields absolutely free from Scald at Silkwood and parts of South Johnstone; even paddocks of newly-planted H.Q. 426 were already dying out in parts from this disease.

## NOTES ON THE BREEDING OF CERTAIN FRUIT FLIES IN CAPTIVITY.

By HUBERT JARVIS, Entomological Branch.

### The Queensland Fruit Fly (*Chatodacus tryoni* Frogg.).

Although the period occupied in the development from the egg to the perfect insect of the fruit fly, *Chatodacus tryoni* Frogg. and other allied species has long been known, it is only recently that the Queensland fruit fly, *C. tryoni*, has been induced to mate, oviposit, and complete its development in captivity. The following information was secured by experimental work carried out at Stanthorpe, during the season 1926-27.

On 10th January, a large field cage 6 feet high, 8 feet long, and 6 feet wide was placed over a small apple-tree in an orchard. This tree was carrying a crop of forty-eight apples of the variety known as Delicious. Each apple was carefully examined and found to be clean and sound. The soil around the tree was cleared from weeds, &c., and all possibility of the escape of flies or maggots eliminated.

On 18th January, about one-quarter of a bushel of maggot-infested fruit was placed in the cage on the ground around the tree. This fruit contained fruit-fly maggots in varying stages of development, the largest being about three-quarters grown.

The first fruit flies emerged in the cage on 7th February, and at the end of the month fifteen or twenty flies could be easily counted. The flies were fed twice weekly, on a dilute sugar and water solution, and from this date onward the fruit was periodically examined for oviposition.

On 21st March, the first stung fruit was observed. The maggots at the time were all in an early stage of development, the largest being about one-quarter grown and the smallest just emerged from the egg. On the date in question males and females were observed together on the fruit, and in one or two instances mating was noted at 10 a.m. Only a few apples were found at this date to be stung, but by the end of the month my assistant, Mr. S. M. Watson, reported additional apples infested, and at the conclusion of the experiment fourteen apples out the forty-eight were found to be infested.

It would appear therefore that the pre-oviposition period of *C. tryoni* in normal summer weather, under the conditions prevailing in the cage, is of at least a month's duration, and it is probable that oviposition first took place about 10th March.

Although no definite data in regard to the mating and oviposition of the Queensland fruit fly has yet been secured, the information obtained is of interest, demonstrating as it does, for the first time, that the fruit-fly will mate and oviposit in captivity under the conditions mentioned.

### The Jarvis Fruit Fly (*Chatodacus jarvisi* Tryon).

The fruit fly *Chatodacus jarvisi* Tryon although of less economic importance than the foregoing species, arriving as it does much later in the season than *C. tryoni*, nevertheless does considerable damage to pommaceous fruits during the months of February and March.

It made its appearance in the orchards this season on 17th February, and on that date a number of living specimens were collected for experi-



mental purposes; the following experiment proves that this fruit-fly will oviposit in captivity, even when confined in a small cage.

A wire gauze flyproof cage 18 inches in diameter and 2 feet in height, was placed on a wide tray containing damped soil. From the roof of the cage one apple of the variety known as Jonathan and one pear of the Winter Nelis variety were suspended; the fruit selected was in a ripening, but not ripe condition, the apple being slightly more mature than the pear.

On 19th February twenty female flies and ten males were liberated in the cage, and they were daily supplied with small pieces of freshly-cut apple and pear on the juices of which they fed greedily. Oviposition took place on 3rd March in the apple and on 11th March maggots were found to be from one-quarter to half grown. The apple was accordingly removed and placed in a breeding jar. Puparia were found under the fruit on 21st March and the flies began to emerge on 12th April. Thus the life cycle of this fruit fly was completed in captivity in about five weeks and five days.

During the experiment the flies were observed to repeatedly visit the pear and feed on some slight exudation on the surface of the fruit, but they did not oviposit, and the pear remained in a sound condition at the conclusion of the experiment.

Although the fruit fly *C. jarvisi* was much more abundant in the orchards during the months stated than was *C. tryoni*, breeding experiments from fruit collected at the end of February showed, on the flies emerging, *C. tryoni* 20 per cent. in excess of *C. jarvisi*.

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## PROTECTION OF NATIVE FAUNA.

The Minister for Agriculture, Mr. W. Forgan Smith, in commenting recently on the matter of the protection extended to native fauna in Queensland, mentioned that the revenue derivable from the royalties on the sale of opossum and bear skins had already been instrumental, and would be much more so in the future, in materially assisting his Department in the preservation of our desirable native birds and animals. Some eight months ago, he had been able to appoint five full-time rangers. These had been stationed in different parts of the State, and, judging by the numerous inquiries that were now being made on native fauna matters practically every day in his Department, they had all made their presence felt in each of the districts in which they are stationed.

Owing to the non-existence in the past of stipendiary inspectors, due to the absence of funds, many of the provisions of the Animals and Birds Acts had been, up to this year, to some extent inoperative; but with the appointment of officers, whose time is exclusively devoted to ensuring the enforcement of the law, a far better measure of protection to our birds and animals is now afforded. The fact that within the past three months there had been forty-five convictions for breaches of the law is further evidence of the rangers' activity. In saying this, Mr. Forgan Smith added that he was still quite appreciative of the splendid work that had been done in the past by the honorary rangers, of whom his Department had 294 enrolled. The Police had been, and were still, ably co-operating in the work.

The whole of the royalty received on the account of opossum and bear skins is placed to a special fund, which is earmarked for the sole interests of our native birds and animals which have an economic or other value.

There are at present in Queensland 154 sanctuaries with an aggregate area of 1,500,000 acres, and no birds or animals can be trapped or shot in these. Here again, the full-time inspectors were ensuring that these reservations were sanctuaries not only in name but in reality.

The Minister hoped to be able to do something with the funds at his command in the direction of a further restocking of districts which had been denuded of native bird and animal life from districts where they were still plentiful.

## IRISH BLIGHT OF TOMATOES.

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

Irish Blight is commonly considered as a disease of the potato rather than the tomato, since it was in connection with the former crop that it first reached economic importance. The disease is due to the attack of a fungus parasite—*Phytophthora infestans*. It was apparently introduced into Europe from South America, the original home of the potato, some time prior to 1842, for at this time it has been recorded as being well established in Europe. In 1845 a serious epidemic occurred in both Europe and North America, of which one of the results was the noted Irish famine. Further severe outbreaks have occurred since then when climatic conditions have been suitable. The tomato is a close relative of the potato, and for that reason several of the diseases affecting one have been able to attack the other. Of these Irish Blight is an example.

### Symptoms.

The first easily noted signs of the disease take the form of dark-brown patches on the leaves, commonly working in from the margin. If the weather is at all wet these areas will assume the appearance of a soft rot and enlarge rapidly. Finally, the entire leaf may become affected and shrivel up. Blackish patches also occur on the stem and leaf stalks. The disease in this case may produce complete cineturing, when the whole of the outer portion of the branch affected will wilt and die. Under moist conditions there will be seen on the under surface of the leaves and on the stem covering the brown areas a delicate whitish down formed by the fruiting bodies of the fungus as they project out from affected tissue. The grower's attention is usually more especially attracted to the disease when the fruit is attacked. A somewhat diffuse light-brown patch arises on the skin of the green fruit. This enlarges and may finally cover a large proportion of the surface, at the same time turning a dark though somewhat mottled brown colour. The margin of the discoloured area may be definite or may diffuse gradually into the general green of the healthy skin. On cutting through an affected area the discoloration will be seen to extend right through the skin of the fruit and may penetrate even the pulp and septa. Very often the fruit rot extends to considerable dimensions before the fructification is produced. This appears later during humid weather as a delicate white mould on the surface of the affected region. The fruit may sometimes constitute the main portion of the plant attacked.

### Causal Organism.

The fungus causing Irish Blight in its ordinary growing stage is very similar to most other fungi, and consists of clear slender-branched threads or mycelium—these threads being less than one-thousandth of an inch in width. They ramify among the cells forming the plant tissue, absorbing nourishment for themselves, and thus bring about the destruction of the invaded part and produce the symptoms described above.

If the weather is sufficiently moist the fungus after a few days vegetative growth will commence to form its fruiting stage. Short aerial threads or hyphae grow out through the breathing pores situated on the under surface of the leaf and other parts attacked. These branch three or four times, and on the ends of the branches are formed delicate lemon-shaped spores or fungus seeds. These spores are produced in



enormous numbers and are so minute that they can easily float about in the air and thus serve to spread the disease throughout the field. Should a spore come to rest on a tomato plant moist with dew or rain, its contents divide up into from six to twelve smaller portions which escape from the spore case and swim round in the surface moisture by means of two vibratile filaments. These swarm spores, as they are called, soon come to rest and send out a slender thread known as a germ tube, which penetrates the surface of the plant, and commences once more on a period of vegetative activity within its tissues. If conditions are not suitable for the development of swarm spores, which must have moisture for their existence, the spore itself may sometimes develop a germ tube direct.

### Contributing Conditions.

Unlike those of many fungi the spores of *Phytophthora infestans* are thin-walled and delicate, and are therefore restricted to certain ranges of temperature and moisture for their development and continued existence. Probably the best temperature for the development of the disease lies between 60 deg. and 70 deg. Fahr. The spores are killed if the temperature approaches 80 deg. Fahr. for any length of time, and at temperatures round about 90 deg. Fahr. the mycelium itself soon dies out in the leaf tissues. For the germination of the spores leading to spread of the disease abundant moisture is necessary, either in the form of heavy dews or rain with accompanying humid conditions. Thus for the occurrence of an epidemic there must be a certain combination of temperature and humidity. In Queensland a temperature suited to the development of Irish Blight is only likely to occur during the cooler months. This period usually coincides with the dry season, hence this disease in normal years does not reach serious proportions. However, it sometimes happens that a period of wet weather occurs during the autumn, winter, or early spring growing season, and considerable loss from Irish Blight is the result. This was well illustrated by the outbreak of Irish Blight in the Bowen district during July-August of this year. Rain to the extent of 1.8 inches fell on 23rd and 24th July accompanied by a sudden fall in temperature, the daily maximum from 23rd July to 3rd August ranging from 57 deg. to 77 deg. Fahr., with an approximate daily average of 58 deg. Fahr. With the advent of hot, dry weather the loss from Blight rapidly diminished. Somewhat similar conditions occurred, on 5th, 6th, and 7th July, and it is probable that the disease commenced to develop at this time though not to an extent sufficient to attract attention. Growers should, therefore, be prepared to take steps to minimise the loss from Irish Blight. The precautions necessary will also aid in controlling certain other leaf diseases to which the tomato is subject.

### Control.

(1) General farm sanitation will go a long way to control most fungus troubles. Plants dying apparently from disease should be immediately removed and burnt. If leaf disease has been present the whole of the crop should be destroyed after harvesting is completed. When possible the same ground should not be planted to the same crop two seasons in succession. Tomatoes should not follow potatoes and vice versâ. The planting of potatoes should be avoided altogether if tomatoes are the main crop.

(2) Bordeaux or Burgundy mixture has been shown to give an effective control over Irish Blight if properly made and applied. The plants should be sprayed when about 6 inches high, and again as often

as necessary to keep the foliage well covered with poison. The number of applications will depend on weather conditions. During wet periods spraying may have to be done every few days, as it is at this time that the spores are best able to germinate and the protective covering of spray is liable to be washed off by the rain. The spraying should be thorough in order to ensure that both upper and lower surfaces of the foliage are covered.

The preparation of both the above mixtures consists essentially in the precipitation of an insoluble copper compound, which although not injurious to the plant will yield sufficient poison to prevent fungus spores germinating.

For Bordeaux mixture there is used 6 lb. bluestone (copper sulphate) and 4 lb. quicklime to 50 gallons of water.

Burgundy consists of 6 lb. bluestone and 8 lb. washing soda to 50 gallons of water. This mixture is the more favoured of the two in some districts as it is somewhat easier to prepare and good quicklime is not always available. Care must be taken that there is no excess of soda, as unlike lime this substance may injure foliage.

There is little to choose between the fungicidal values of the two mixtures when properly prepared. About 50 to 100 gallons will cover an acre, depending on the type of spray pump used and the size of the plants.

The bluestone is dissolved in half the quantity of cold water in a wooden vessel. This is best done by tying the crystals in a piece of hessian, &c., and leaving them suspended in the water over night. Pulverised bluestone may now be obtained which is quickly dissolved.

The quicklime or washing soda is added to the remainder of the water in another vessel. Quicklime is best first slacked by the gradual addition of small quantities of water, as the heat generated will aid the reaction.

The two solutions—bluestone and lime or washing soda—are then poured simultaneously through a strainer into a third container or the spraying vessel and the mixture stirred well for a few minutes.

Only wooden or copper vessels can be used to contain bluestone solutions, as this chemical will eat through iron.

It sometimes happens that the lime or soda used is not of good quality and the resultant mixture may then contain a surplus of bluestone. This must be avoided as copper sulphate is capable of causing injury to the plant. An excess may be tested for by allowing the gelations precipitate to settle out of a portion of the spray and then applying red and blue litmus paper to the clear liquid remaining on top. If the blue paper is turned red, more lime must be added until no change takes place. If Burgundy is being tested and the red paper turns blue, more bluestone will have to be added as free soda in this case may also cause spray injury.

A rough test for excess bluestone is given by allowing a clean knife blade to remain in the mixture for a few minutes. When this shows a brown coating of copper on removal, more lime or soda is required.

The spray should be applied as soon as possible after preparation as it tends to lose its gelatinous nature and settle out.



### COTTON CROP PROSPECTS.

The Minister for Agriculture and Stock, Mr. W. Forgan Smith, informed the Press recently that from reports which had been received from the Departmental field officers, it appeared that the planting conditions over the whole of the Cotton Belt were the best that had been experienced in recent years. Not only had excellent rains fallen, but the standard of the preparation of the seed bed was of a decided improvement over those of recent seasons. The experiences of growers, in nearly every district during the past seasons, have demonstrated conclusively that early prepared seed beds are of marked advantage in obtaining an early planting. It also has been demonstrated that early planted crops afford a better insurance of obtaining larger yields. Those facts are impressing the growers more forcibly each season, and this past winter has seen most of the growers endeavouring to prepare their land at the earliest opportunity.

The wisdom of such a procedure has been shown this season in several of the districts. Planting rains fell in the Dawson, Callide, and Upper Burnett Valleys around the 11th September. Those growers who had prepared their land in July and early in August were able to obtain a splendid strike on these rains. The recent series of storms will assure the development of the young plants in such crops, and will enable them to resist any periods of hot dry weather which may occur later.

### Price Prospects.

Such an excellent start augurs well for those growers who have been able to obtain the early strikes. The indications are that the prices for this coming crop will be satisfactory, and will compare more than favourably with those which have been realised for the crop which has just been harvested. The Cotton Board has paid up to 4½d. per lb. for the top grades, and advise that it anticipates being able to pay at least another half-penny in the final bonus distribution. These prices have been obtained on a market in which the ruling values were of much lower average than appear probable for the coming crop. Recent cables state that the United States Government forecast for the American crop which is being harvested now, indicate a probable crop around 12,700,000 bales as compared to 17,000,000 bales for last season. The cause of such a marked reduction has been the recurrence of the boll weevil in such numbers in some sections as to destroy the greater part of the crop. If this forecast is realised, it means that the large carry over of cotton throughout the world's cotton markets will be diminished. This will tend to firm the prices and prevent such a disastrous drop as that which occurred in respect to the last crop.

The Cotton Board has intimated that it is making an effort to arrange so that a larger initial advance may be paid to the grower for the coming crop on the receipt of his cotton at the Ginnery. This, in conjunction with the excellent prospects for good prices, should make cotton-growing a very attractive proposition to those growers residing in the proved cotton-growing districts.

### Demand for Queensland Cotton.

Recent advices indicate that the Australian demand for Queensland cotton will be considerably increased for the coming crop. This fact, in conjunction with the very opportune rains which have fallen this spring, make it appear that every cotton-grower should endeavour to plant the maximum acreage which he can grow properly. Seed applications indicate that the growers in the Central Queensland areas are following this practice, as marked increases in the individual growers' acreages are reported.

The occurrence of good rains recently over the area extending southwards from Gayndah should lead to a greater acreage being planted in the Southern districts. The indifferent results experienced during the last three seasons in these districts have checked the development of the industry to a great extent. These results have in a great measure been due to insect attacks on late-planted cotton.

*EVERY FARMER SHOULD HAVE THE JOURNAL.*

*A Bell farmer writes: "I must say your Journal is very interesting and contains valuable information. I think that not only should every farmer have it, but every learner, too. . . ."*

## COCCIDIOSIS OF CHICKENS.

P. RUMBALL, Poultry Expert.

Coccidiosis is probably the most destructive disease of chickens met with in Queensland. The disease, however, does not confine itself to this class of stock only, as adult birds are frequently affected in a chronic form, while well-developed pullets frequently go in the leg as the result of infection. With chickens from two to eight weeks, the disease assumes most serious proportions under favourable conditions.

The disease is caused by microscopic parasites, termed *Eimeria Avium*, which, when ingested by susceptible chickens rapidly develop and multiply in the walls of the intestines, and particularly the cæca or blind gut.

### Symptoms.

The first indication of the disease is the tendency of chickens to bunch together, with closed eyes and drooping wings. On being disturbed they move about, apparently perfectly normal, with the exception that they appear to have exceptionally short backs. The tips of the wings, vents, and rear portions of the body are frequently stained with excreta. If an examination be made of the excreta of chickens, it will be usually found to be of a brick-red colour, due to the presence of blood. During the day or following morning some of the chickens will be found dead, and the number of shortened-backed, droopy-winged chickens added to. On opening up the chickens that have died, the upper portion of the small intestines is inflamed, and among its contents blood will be found. The inflammatory condition in chickens is usually more pronounced in the cæca, which is generally greatly distended and filled with blood, and in many cases the lining of the cæca will be found to have disappeared. Other organs are generally in a healthy condition.

The parasite responsible for this disease passes through many stages in its life cycle, the first being the egg stage. The egg of the organisms, known as an oöcyst, is voided from a diseased bird with the droppings. If again taken into the digestion tract of stock in that condition, no harm will result, but the conditions under which chickens are generally reared are such as to permit of sporulation, and when sporulated oöcyst gain an entrance to the digestion tract of susceptible chickens, a serious outbreak of disease is bound to result. When the sporulated oöcyst enters the intestines of the chicken another change takes place, and the parasite then commences to live upon the mucous lining of the intestine and cæca, undergoing several changes until the egg stage (oöcyst) is again ready to be voided with the droppings to undergo sporulation.

It is claimed by some authorities that the sporulated oöcyst will remain alive in the soil for a year or more; therefore, breeders who have been troubled with the disease should take precautionary measures to prevent its recurrence. It will also be readily understood how easily contamination can be spread from pen to pen by the organism adhering to the boots of the attendant, feeding, watering utensils, &c.

### Treatment.

Medicinal treatment has been found to be of little use, therefore preventive methods should be adopted, and in outbreaks the worst cases destroyed. As the general stamina of the chickens is the best safeguard against serious infection, the arrangements for brooding purposes and the feeding of the chickens is of primary importance. Knowing that the first stage of the parasite—that is the egg or oöcyst before sporulation has taken place—is not harmful and that sporulation is only possible where there is sufficient dampness and warmth, brooding houses and runs should be as free from damp as possible. The congested condition under which chickens are reared naturally tends to foul the pens and brooders, and if the organism causing the disease is present, makes it a hotbed of infection; therefore, the thorough cleaning at frequent intervals is highly essential. The practice of scattering grain about the runs, highly desirable as a rule, should not be permitted when the disease is present, but grain and all food used should be fed in suitable receptacles that can be thoroughly cleansed once or twice a day.

The feeding of fresh skim milk and buttermilk powder have, to the writer's knowledge, checked outbreaks of the disease on various farms, but without the application of strict sanitary conditions, in conjunction with the milk feeding, very little good can be expected. If fresh skim milk is available, it can be used as the only form of a drink; whereas, with powdered buttermilk powder, it may be used



for a few days pure until the trouble is checked and then used to form a definite proportion of the dry mash mixture. Buttermilk not only has curative properties in connection with coccidiosis, but is a splendid feed for both laying and growing stock, and poultry raisers could well make this food form a portion of their standard mash rations. As a sole source of animal protein in a mash, it could be used to the extent of 10 per cent., but when troubled with coccidiosis, the ratio could be considerably increased for two to three weeks and then reduced to normal.

Both liquid milk and buttermilk powder have the effect of causing the droppings to become of a very liquid nature, and consequently frequent cleaning is necessary.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF SEPTEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING SEPTEMBER, 1927 AND 1926, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Sept.	No. of Years' Records.	Sept., 1927.	Sept., 1926.		Sept.	No. of Years' Records.	Sept., 1927.	Sept., 1926.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
Atherton ... ..	In. 0.72	26	In. 0.28	In. 2.81	Nambour ... ..	In. 2.56	31	In. 6.97	In. 7.36
Cairns ... ..	1.75	45	1.45	4.83	Nanango ... ..	1.91	45	0.54	2.25
Cardwell ... ..	1.60	55	1.37	12.19	Rockhampton ...	1.40	40	1.39	5.26
Cooktown ... ..	0.61	51	0.43	2.32	Woodford ... ..	2.21	40	5.20	3.90
Herberton ... ..	0.51	40	0.17	0.94					
Ingham ... ..	1.57	35	2.52	11.08					
Innisfail ... ..	3.76	46	1.70	13.15					
Mossman ... ..	1.67	14	1.14	6.25					
Townsville ... ..	0.86	56	1.07	4.60					
<i>Central Coast.</i>					<i>Darling Downs.</i>				
Ayr ... ..	1.56	40	0.95	4.66	Dalby ... ..	1.77	57	0.37	1.74
Bowen ... ..	0.87	56	0.97	4.30	Emu Vale ... ..	1.90	31	0.29	1.09
Charter Towers ...	0.79	45	1.02	1.96	Jimbour ... ..	1.60	39	0.68	1.77
Mackay ... ..	1.68	56	1.42	6.23	Miles ... ..	1.47	42	0.25	1.43
Proserpine ... ..	2.35	24	2.42	8.14	Stanthorpe ... ..	2.40	54	0.51	0.73
St. Lawrence ... ..	1.31	56	1.12	0.69	Toowoomba ... ..	2.23	55	1.49	3.26
					Warwick ... ..	1.88	62	0.61	1.25
<i>South Coast.</i>					<i>Maranoa.</i>				
Biggenden ... ..	1.64	28	1.47	1.37	Roma ... ..	1.54	53	0.56	1.74
Bundaberg ... ..	1.73	44	1.00	0.87					
Brisbane ... ..	2.05	76	1.77	2.41					
Caboolture ... ..	1.92	40	3.15	2.75					
Childers ... ..	1.90	32	1.89	1.52					
Crohamhurst ... ..	2.80	35	6.14	6.32					
Esk ... ..	2.25	40	1.60	3.13					
Gayndah ... ..	1.58	56	3.13	1.82					
Gympie ... ..	2.17	57	2.41	3.72					
Kilkivan ... ..	1.77	48	0.98	3.71					
Maryborough ... ..	1.99	55	2.09	3.50					
					<i>State Farms, &amp;c.</i>				
					Bungeworgorai ...	1.25	12	0.03	1.38
					Gatton College ...	1.67	27	1.27	1.36
					Gindie ... ..	1.13	27	0	1.57
					Hermitage ... ..	1.68	20	0.68	1.24
					Kairi ... ..	0.60	12	0.29	2.63
					Sugar Experiment Station, Mackay	1.48	29	2.17	5.39
					Warren ... ..	0.76	12	1.25	2.10

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for September, this year, and for the same period of 1926, having been compiled from telegraphic reports, are subject to revision.

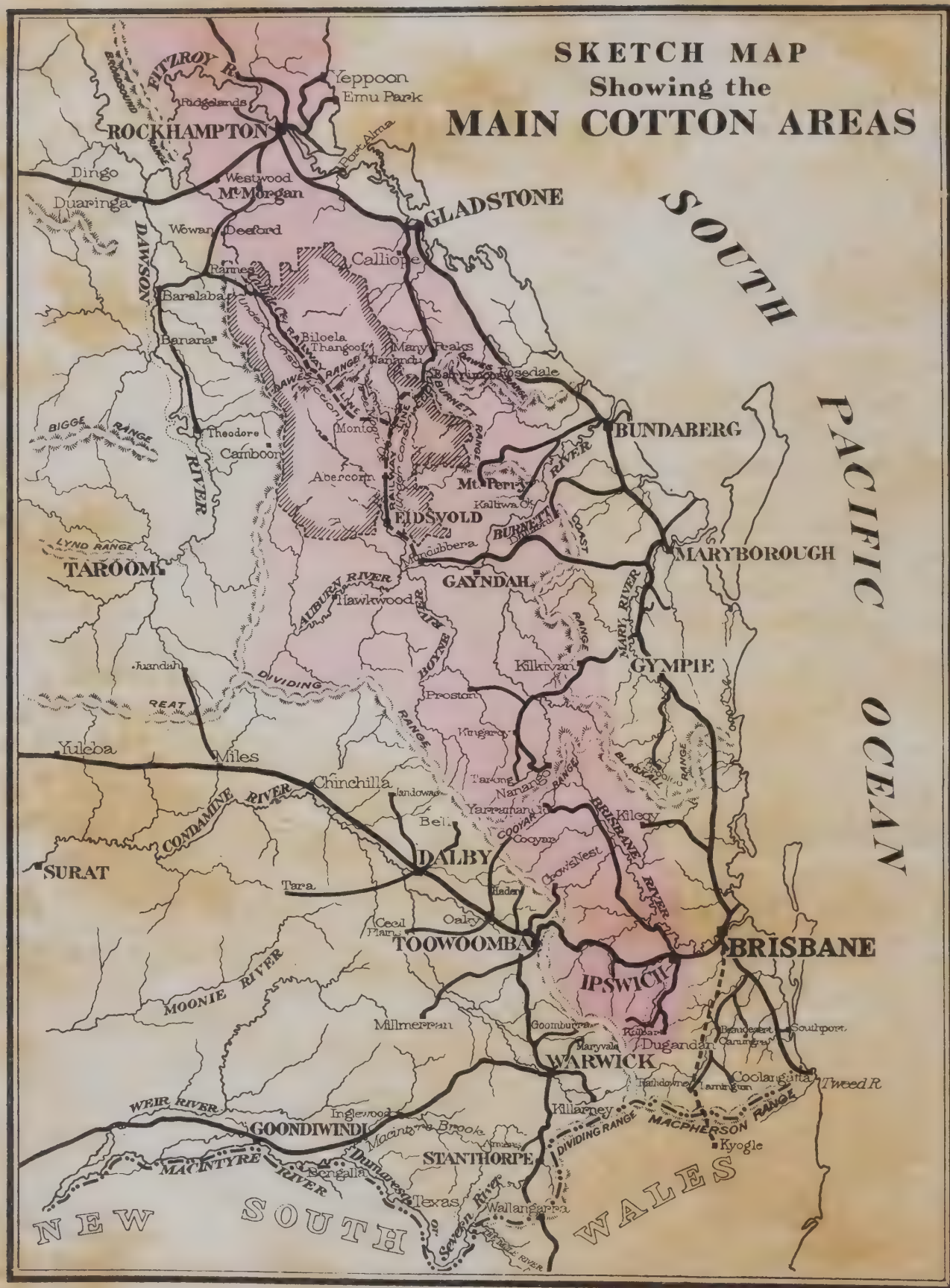
GEORGE G. BOND,

Divisional Meteorologist.





**SKETCH MAP**  
**Showing the**  
**MAIN COTTON AREAS**



# COTTON GROWING IN QUEENSLAND.

## PART I.

### Cotton Cultivation.

By W. G. WELLS, Cotton Specialist.

THE history of the initial stages of the development of the cotton-growing industry in Queensland has been described in former papers on this subject.<sup>1</sup> It is proposed in this bulletin to discuss the more important phases of the cultivation of the cotton crop, the insect pests which attack it, the methods of controlling them, and the present status of the industry.

During the period of the existence of the Commonwealth and Queensland Governments' system of guaranteed advances on seed cotton which expired at the end of the 1925-1926 crop, a great portion of the agricultural sections of this State was tested as to the suitability for growing cotton. As was to be expected with a comparatively new industry, many of the tests were made on unsuitable soils or in areas of adverse climatic conditions. The general results secured, however, from these experimental plantings, both by co-operators with the Department of Agriculture and individual farmers, have been of inestimable value in determining what districts are the most suitable for producing profitable crops.

It may be said then that the industry has passed through the investigational stages in this respect, and that the areas in which the cotton crop will return profitable yields have been fairly well ascertained. Generally speaking, they lie along the slopes and medium alluvial loamy flats of the valleys of the eastern watershed of the Great Dividing Range, from north of Beaudesert in the south to the Fitzroy River and areas adjacent in the north, and lying in behind the coastal ranges from Brisbane to Gladstone and thence north to Rockhampton. This covers an area of some 400 miles long by 50 to 150 miles wide.

The accompanying map roughly shows the areas.

### CLIMATE.

#### Temperature.

The climate through most of the Cotton Belt may be described as normally suitable for the production of heavy-yielding crops of cotton. The period usually free from frosts, with the exception of a

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<sup>1</sup> Cotton Cultivation: H. C. Quodling; Bulletin, Department of Agriculture and Stock, 1922. Cotton Cultivation: W. G. Wells; Bulletin, Department of Agriculture and Stock, 1923.



few small areas, commences during the first half of September and extends until at least the end of April. Light frosts may be experienced at this stage in some seasons, especially in the inland areas occurring at altitudes of 400 to 600 ft. or higher above sea-level. Frequently no frosts are experienced before the middle of June over the whole of the belt, so it can be seen that a long growing period usually exists.

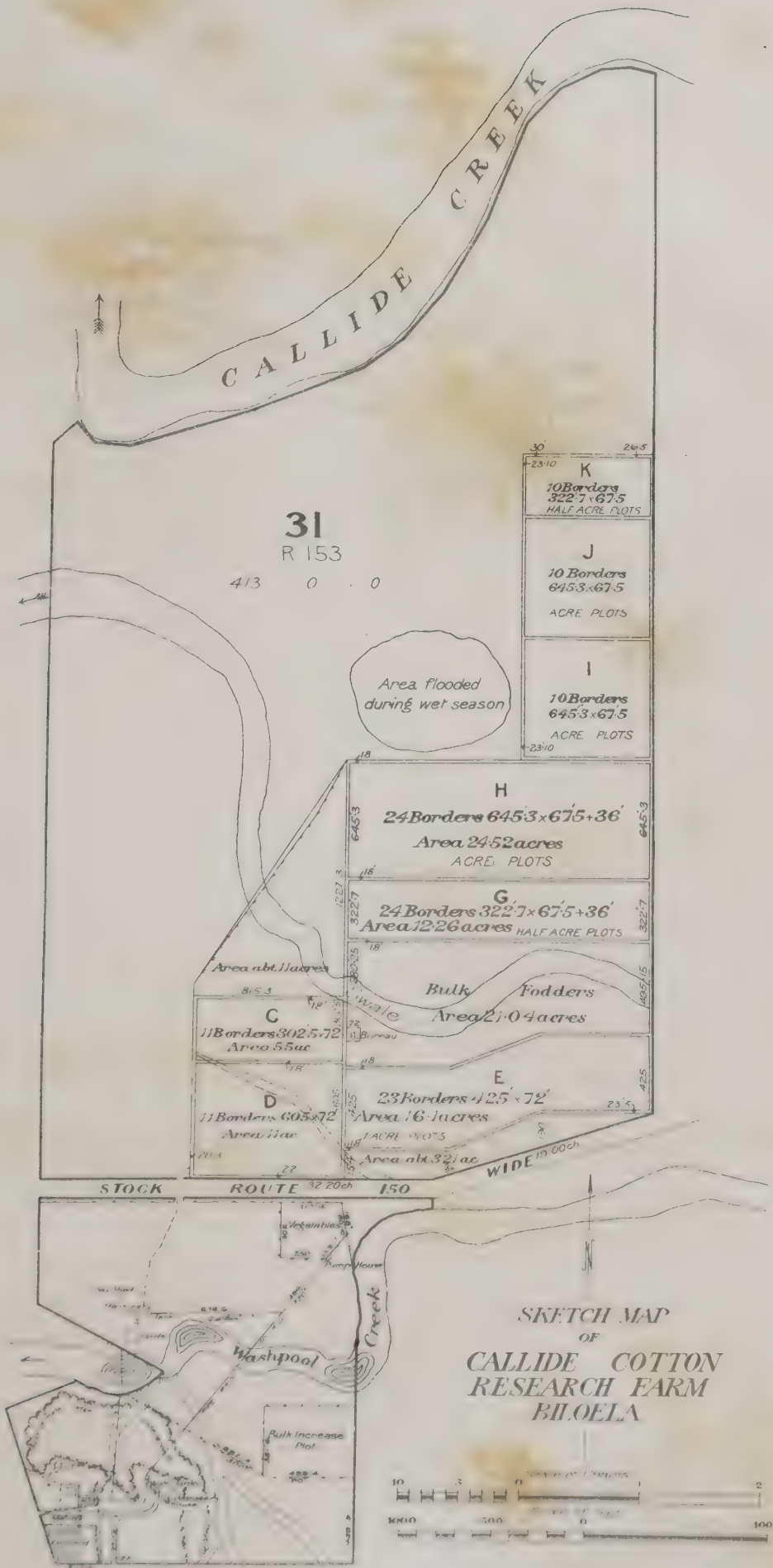
The daily temperatures during the growing period range from a minimum of 45 to 55 and a maximum of 75 to 80 in the spring, to a minimum of 60 to 75 and a maximum of 85 to 100 in midsummer with an occasional day over 100. During the higher temperatures there is usually a low amount of humidity, so that, while hot, no excessive discomfort is felt. These temperatures cover the average of the belt, although in some of the areas of the higher elevations the figures will be lower throughout the season, especially at night. During the harvesting season the maximum temperatures lessen rapidly so that the bulk of the crop is picked normally in delightful weather.

### **Rainfall.**

Sufficient rainfall generally occurs during the latter half of June and in July to enable well-prepared seed-beds to be established if the operations are performed at the proper time. August usually is dry until near the end of the month, when scattered to even general rains normally are experienced over most of the Cotton Belt. These precipitations of a scattered nature may continue through the early half of September, but after that period only isolated storms can be expected until November, when a series of thunderstorms usually occurs in nearly all of the districts. The main summer rains normally commence in December and continue at varying intervals through January, February, and the first part of March. From then on until June a period of clear hot weather in the day and gradually increasingly cooler nights ordinarily exists, which provides a nearly perfect harvesting season. This is shown by the high percentage of the top grades which are obtained, fully 75 per cent. of the crop usually being of the World's Universal Standard grade of Strict Middling or better, with a large amount equalling the grade of Strict Good Middling cotton.

The average total yearly rainfall varies somewhat in the different districts, but may be described as ranging from 22 to 35 in., with the greater portion of the belt receiving about 28 to 30 in. Unfortunately these amounts may include falls occurring during storms of a tropical nature when 4 or 5 in. may fall in two or three hours, in which case little benefit may be received.

The record for 1925-26 at the Callide Cotton Research Station is included as an illustration of the nature of the distribution of the rainfall which may be experienced over many of the cotton belts.







DAILY RAINFALL, CALLIDE RESEARCH FARM, 1ST JULY, 1925, TO 30TH JUNE, 1926.

Day.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	..	..	..	..	..	36	267	..	..	..	..	2
2	..	..	..	..	..	..	3	..	..	..	..	..
3	..	..	..	..	4	11	60	..	..	..	..	..
4	..	25	..	..	..	..	24	..	..	..	..	..
5	..	..	18	..	75	11	..	..	..	..	..	..
6	..	..	..	..	..	..	169	..	..	4	..	..
7	..	..	..	..	..	..	9	..	..	..	..	79
8	..	..	..	..	..	..	455	..	..	..	..	..
9	..	..	..	..	141	..	..	..	..	..	..	..
10	..	..	..	18	4	..	..	457	33	..	..	..
11	..	58	..	..	..	..	..	86	36	..	2	..
12	..	..	..	..	..	..	..	37	..	5	13	..
13	..	..	..	..	..	..	..	68	..	..	2	..
14	..	..	..	..	6	..	..	..	..	..	..	..
15	..	..	..	..	..	96	..	..	..	6	6	..
16	..	..	137	..	..	35	..	..	..	..	6	..
17	..	..	52	..	..	..	9	..	..	..	195	..
18	..	..	..	..	..	..	14	..	..	..	..	..
19	..	..	..	..	..	..	..	..	..	..	..	..
20	..	..	..	..	..	..	9	..	..	..	..	2
21	..	..	..	..	..	..	..	..	..	..	..	..
22	..	..	..	..	54	..	..	..	..	..	..	..
23	..	..	..	..	..	..	..	..	..	..	..	..
24	..	..	5	..	..	135	..	..	..	..	..	65
25	..	..	..	..	..	..	..	65	..	..	..	15
26	..	13	..	..	..	..	..	..	..	..	..	..
27	..	..	..	..	..	..	..	..	..	..	..	..
28	..	..	..	..	..	..	..	..	..	..	..	..
29	..	..	29	..	..	..	..	..	..	..	..	..
30	..	..	10	..	..	22	..	..	..	..	..	..
31	..	..	..	..	..	47	..	..	..	..	40	..
Monthly Total ..	96	39	212	18	284	393	1,019	713	69	15	264	163

Yearly total—32·85 inches.

SOILS.

The cotton plant appears to be able to adapt itself to a wide range of soils, but the experiences of the farmers of Queensland during the last five years seem to indicate that certain soils are far more suitable than others. It must be remembered that climatic conditions play an important part in deciding the suitability of a soil for the producing of a heavily laden cotton plant. The time of planting of the crop is also a deciding influence.

Suitable Soils.

Given a moist subsoil, an early-planted crop of cotton may produce a very profitable yield with the proper climatic conditions, on several classes of the soils found in the Cotton Belt of Queensland. These include the rich alluvial creek loams; the grey and the brown scrub soils; the sandy loamy slopes and ridges with a clay subsoil and which originally were covered with a combination of the narrow-leaf iron-bark, the Moreton Bay ash, and good-sized bloodwood trees; the brown forest soils; and the apple-tree sandy-creek flats.



It is when some of the necessary factors are absent that difficulties in obtaining profitable yields are encountered. Generally speaking, it may be safe to assume, when the crops are planted late, that in districts which are liable to receive heavy rains in January and February it is wise not to plant on soils that do not have a good drainage or which are of exceptionally rich fertility. The difficulty with late-planted cotton is to have the plants sufficiently laden to control the growth on fertile soils under luxuriant growing conditions. The general experience has been that the gravelly loamy slopes are better suited for such crops, as the plant makes a slower, stockier growth with a consequent heavier setting of fruit. In the Callide Valley, the clayey loamy soils occurring at the junctioning of the loams and the box-tree clay flats appear also to be well suited for late-planted cotton. Such a plant is not so likely to develop an excessive vegetative growth at the expense of the crop of fruit when excessive rainfall occurs. As early planting rains do not always occur in some areas, it can be seen that this is a very important factor, and one that every farmer should investigate on his own place in order to know what to do when such conditions arise.

### **Unsuitable Soils.**

The consensus of opinion of most farmers who have experimented with growing cotton on the heavy black soils of the creek flats, such as in the bottom of the Lockyer Valley and in districts of similar nature, is that they are not suitable for cotton culture unless under exceptionally favourable conditions. Where good winter rains have fallen on an early prepared seed-bed, so as to put ample moisture in the subsoils, heavy yields from early-planted crops may be secured. The great difficulty with such soils is that they are difficult to cultivate during periods of showery weather after the crop is up. The pigweeds, convolvulus, and various other weeds difficult to eradicate by machinery when once established, particularly infest these classes of soils, and if the cotton crop is planted late the control of the weed growth often becomes a very expensive item.

The red softwood scrub soils have as a whole proved to be unsuitable for cotton production over any length of time. Analyses of such soils have nearly all shown that they are lacking in phosphates or potash and sometimes both. The usual results obtained from such soils have been good or even excellent crops the first two years after the scrub has been burned, but where cotton crops have been planted on old cultivated paddocks of these soils the results often have been extremely unprofitable.

### **SIZE OF COTTON AREAS.**

Although the area marked on the enclosed map indicates that a large section of country is suitable for cotton-growing, only a small portion of it actually has been in cotton. During the years 1921-26 inclusive, the maximum area harvested in any one year was approximately 40,000 acres. The tendency of many of the growers has been to limit their acreage

to such as they can cultivate without employing labour other than that necessary to harvest the portion of the crop which the grower and his family could not pick. Under such a system the average cotton plot in the older settled areas has varied from 5 to 15 acres, with the majority around 10 acres. In the newer areas, especially in the sections some distance from butter factories or markets for farm products, the acreages have varied from 20 to 100 acres, as the grower has concentrated his labour on cotton-growing. It is believed, as the farmer becomes more familiar with cotton-growing, and sees the advantage of using machinery which will effect the most economy in labour, that the individual acreage will increase in size. This enlargement of the individual acreage is desirable, as it not only decreases the cost of production but increases the chances of improving the uniformity of the bale of lint. The growers of the larger acreages send in more cotton in the one consignment, which enables the ginning to be performed with the least amount of mixing of styles of fibres. This also tends to decrease the cost of overhead expense in the various activities at the ginnery, and should be practised wherever possible.

It is not considered advisable to grow only cotton unless the problem of marketing eliminates other crops. Nearly all of the areas where cotton is being successfully grown can grow other agricultural products which may be utilised in dairying, pig-raising, &c. Where cotton-growing is combined with such industries, it may be considered an excellent cash crop which fits into nearly every rotation which can be practised to advantage. This feature makes it appear that every farmer in the areas where cotton can be grown profitably should include this crop in his regular plan of operations. Over a series of years it is believed that the returns per acre received from it will compare favourably with the other crops that can be grown in the ordinary agricultural areas of the State.

### **FARM EQUIPMENT.**

A large percentage of the cotton-growers was already established on farms in the agricultural districts before the increased interest in cotton-growing occurred in 1921-22. In many cases the farms were equipped with only walking scufflers, single-row planters, and such machinery which the usual small "mixed farming" type of place would have. The farmers naturally have endeavoured to grow the cotton crop with this equipment. On some lands these implements, with some modifications, have been about as suitable as could be used, especially on the slopes or in small irregular plots. Where the land is suitable to the use of riding cultivators and two-row planters, it is believed that the greater efficiency of these machines justifies their purchase. In order to reduce the cost of interest and depreciation per acre and also to obtain the full benefit of the efficiency of these implements, it is necessary that the grower should have at least 15 to 20 acres of cotton. It should be realised that such equipment is suitable also to the cultivation of the other ordinary farm crops that the average cotton-grower can grow, and the use of it reduces the expense on such crops as well.



Reducing the cost of production is an important problem in cotton-growing in Queensland, and every device which can effect this result should be utilised. Labour-saving machinery can be employed to great advantage on the average cotton farm of this State. One man with a one-horse scuffler can cultivate an average of approximately  $3\frac{1}{2}$  to 4 acres a day, whereas with a two-horse riding cultivator he can cultivate up to 7 acres a day and do better work as well. A double saving is effected in the one operation with the riding cultivator, in that more area is covered per man per day and the points of the riding machine can be set close to the row, which enables the destroying of more weed growth than where the one-row scuffler is used. In this respect it is preferable to use a pivot or driver steered machine to one of the rigid tongue type, with which the steering is done by directing the horses. Unless the team is evenly gaited and used to such work, it is exceedingly difficult to steer the implement when the inner points are set close enough to remove weed growth near the plants. With a machine which is steered by the driver, excellent work can be performed within a few inches of the plants without the slightest damage to them. Several types of these machines are on the market in this State now, and the growers should use them.

The use of the two-row split-wheel type of combination maize and cotton planter is also of decided advantage. A man with a one-horse single-row planter can plant from 4 to 6 acres a day, whereas with a two-horse two-row planter he can plant 10 to 14 acres a day depending on the speed of his horses and the length of the rows.

This is of marked advantage in districts where the spring rains are somewhat precarious. Frequently planting has to be done following a fall of 50 to 60 points of rain. Speed is a big factor in the success of the operation under such conditions, and the quicker performed the more likelihood of success, especially under the windy conditions which often prevail at planting time.

Another decided advantage obtained by the use of this type of planter is that the planting is effected more uniformly than with some of the combination planter-cultivators on the market. Having the planting spouts with disc openers just ahead of the wheels tends to insure the spout and the press-wheel being more in the same plane than where the spout is some distance from the wheel, as in the other types mentioned. The split-wheel appears to be of the utmost importance where planting is effected following a storm of some 50 or 60 points of rain. The packing action of the rims of the wheel on the sides of the seed rather than on the top insures the seed being in firm moist soil and at the same time leaves a loose mulch on top to prevent evaporation. As the weight of the machine and the driver is borne by the rims which press the soil against the sides of the seed, it can be seen that a decided firming of the seed-bed directly under the seed is also accomplished, which assists in making contact with the moisture of the subsoils.

Where the acreage to be planted is too small to warrant the purchase of a two-row machine, the grower may secure very good results with some of the single-row split-wheel planters. These machines utilise the same principle of covering the seed, but may be somewhat light for obtaining the same pressing effect around the seed. This can be effected by carrying a partly filled sack of seed on the back part of the frame.

### PREPARATION OF THE SEED-BED.

The uncertainty of the winter rains is the most disturbing factor in the growing of cotton in Queensland. In some seasons they are very light, and, unless the seed-bed is prepared early so as to receive the full benefit of such rains, difficulty may be experienced in maintaining a stand during the dry, windy period of October, owing to the lack of subsoil moisture. The initial stage of the development of the young plant usually occurs in this month, and, unless there is sufficient moisture to enable the developing tap-root to supply the tender plant's requirements, serious losses may be experienced. Early, properly prepared seed-beds can discount this factor to a great degree, however, as has been demonstrated by large numbers of farmers who have obtained good strikes every season and at the Callide Cotton Research Station, where very little difficulty is ever experienced in this respect. Nevertheless it is a serious problem, and the cotton-grower should recognise it as such and endeavour to prepare the seed-bed at the earliest possible period in order to take full advantage of any winter rains which may occur.

Where the new crop is to be planted on land which is in cotton, it is believed that greater benefit is to be obtained by cutting down the plants by the middle of July at the latest. There may be a fair top crop of green bolls on the plants at that time, but investigations over the last few years have shown that a considerable proportion of these bolls contain stained cotton caused by fungus diseases in conjunction with attacks of the sucking insects (*Dysdercus* *sidæ* and *Tectacoris* *lineola*). Attacks by the peach moth grub (*Conogethes* *punctiferalis*) and the pink boll-worm (*Platyedra* *gossypiella*) also may destroy a considerable percentage of these late bolls, so that the grower will often be disappointed in the amount of good cotton which he obtains from what appears to be a fair top crop of bolls.

Where the grower has a dairy the cows may be turned into the field after the last picking, so that they can feed on the green bolls and squares and thus destroy any insect life which may be present in them. When this is completed, the stalks should be cut and burned as soon as sufficiently dry.

The cutting of the stalks can best be effected by means of a slide with knives on each side. This machine, which is similar to the maize slide-cutter, can be made on the farm, and requires but two worn-out crosscut saws. These are ground to a knife edge, and holes bored through which to bolt the blades to the slide.



The ploughing of the land should be performed as soon as possible after the burning of the stalks. In some districts the soil may be exceedingly dry and hard, but it is believed that the ploughing should be done as soon as the crop is cleared off, so that the full benefit of any rains falling during July may be obtained. In case the soil breaks up very cloddy, an efficient roller can be made of a tree-trunk with iron spindles and a frame set upon these.

### **Depth and Number of Ploughings.**

There appears to be a diversity of opinion in regard to the depth and the number of times of ploughing. Some growers contend that one ploughing is sufficient, and in this school of thought the recommended depth may range from 6 to 12 inches; the advocates of the deeper ploughings maintaining that a deeply ploughed soil offers more opportunity of storing moisture for the plant's requirements later in the season. This might be true if the winter months usually received sufficient rainfall to moisten the ploughed bed to the subsoil. Unfortunately most of the Cotton Belt does not receive such rain, and the deeper the ploughing, if made in the winter, the greater may be the width of a dry zone of loose earth overlying the subsoil at planting time. Other growers maintain that two ploughings are necessary to thoroughly prepare a proper seed-bed. This may be so where the land is grassy, when a shallow ploughing will be required at first to expose the roots and then later a deep ploughing to turn everything under. For ordinary conditions it is believed that two ploughings are not necessary and the amount of labour expended would be better utilised in harrowing and sometimes rolling to firm the seed-bed.

From results obtained at the Callide Cotton Research Station on alluvial clayey loams, it appears that one ploughing of 6 or 7 inches in depth is all that is required on old cotton land. The land is then rolled to firm it and break up any large clods, and then harrowed so as to leave a deep mulch. Harrowing is performed after all rains, and by planting time the seed-bed is generally of a firm, compact nature underneath but with a decided springy feeling on top to one walking over it. Fifty points of soft rain will give a splendid strike on such a soil, as only a shallow harrowing is made after the planting rain, with a lever harrow with the teeth set back at a fair angle. This leaves a nice mulch on top and yet does not stir up the seed-bed under the surface.

Where the land is trashy or weedy to such an extent that it appears desirable to plough twice, it is suggested that the last ploughing should be made at least a month ahead of planting time. This allows the soil to settle and firm the seed-bed. From observations made in various districts, it is believed that a great deal of damage is done each season in the Cotton Belt by late cross-ploughing. Cases have been observed where such ploughing was being performed from which the only result to be obtained was the loss of what moisture there was in the surface

soil. With as scant a winter rainfall as has most of the Cotton Belt, it appears only reasonable to believe that the less the lower soils of the seed-bed are disturbed after the first ploughing, the firmer the seed-bed will become. Numerous examples have been noted where planting has been made following 50 to 60 points of rain falling on a late prepared, loose seed-bed. The seed germinated and grew well where subsequent rains wet up the lower soils, but where droughty conditions prevailed the young roots soon penetrated to the dry layer of loose soil lying on the subsoil, and the strike was badly depleted during periods of hot, burning winds which occurred in late October and early November. In the same district and on similar soils which had been prepared in the manner which has just been suggested, not only were excellent stands maintained through such periods, but the young plants made splendid progress, which showed that they quickly penetrated through the firm seed-bed into the moist subsoils.

## PLANTING.

### Methods.

As has been pointed out, planting operations can best be performed by the split-wheel type of planter equipped with disc-openers on the seed-spouts. On the Cotton Research Station excellent strikes have been obtained each season with this type of machine while farmers in the same district have only been partially successful with other types of machines, or where good strikes have been secured, have experienced the dying out of sufficient plants during periods of hot dry weather to affect materially the ultimate stand. It is believed that the pressing of the loose soil around the seed firms it to such an extent as to enable the lower moisture to rise to around the seed, and thereby assist in the development of the root system of the young seedling in the early stages.

Nearly all other types of planters lack this feature, as the seed is usually dropped in a shallow furrow made by single or double disc-openers and then covered by means of scrapers. The weakness of such a system can be seen in that there is no firming of the soil around the seed, and therefore no aid to assist the movement of the ground moisture.

In some of the districts where the individual acreage of cotton is generally so small as not to warrant the purchasing of a cotton planter, the custom is to plough out shallow furrows with a single-furrow plough and then drop the seed by hand in the bottom of the furrow. The seeds are then covered by means of a one-horse scuffler with the frame closed up so that the teeth work in the moist soil on the sides of the furrow. This method gives good results if the soil is well moistened and the covering is made at a uniform depth. It is believed that the best results will be secured if the scuffler has a wheel attachment in front running on top of the seed. This presses them on to the firm, moist soil below and also assists the operator in covering at a more uniform depth. The



main feature of this method is that the planting and covering should be done immediately behind the ploughing of the furrow in order to avoid loss of moisture.

A modification of this system is used where the winter rains have not occurred. The furrows are ploughed in the dry seed-bed and left open for the fall of the planting rains. Upon the occurrence of these, the seed are distributed along the bottom of the furrow and then covered by means of the one-row scuffler. This leaves a shallow depression where the row is, and it may be that this is of advantage in a dry windy spring, as some protection may be afforded from the winds.

Another method of planting frequently used by the farmers in the drier areas is to plant the seed in a dry seed-bed, with the idea that a strike will be obtained in case of only light falls of rain occurring. This may be a wise procedure where a farmer is growing large areas and has a limited amount of labour with which to effect the planting. In such circumstances, by planting dry he is assured of obtaining the full benefit of a light storm. However, there are dangers associated with this system which should be considered. In the first place, a fall of 20 or 30 points of rain usually means that the seeds start swelling and then, owing to the drying out of such a small amount of moisture, further development ceases with a consequent rotting of the seed. Another feature is that if a germination is secured with a light rain there is danger of a considerable loss of stand occurring unless rain falls soon after the seedlings appear above ground, owing to the lack of moisture underneath prohibiting the development of a proper root system. In such a case the chances are that, if part of the stand has been lost before the necessary rain comes, the grower will be inclined to carry on with the plot, and therefore be handicapped all season from obtaining the full possibilities of his soil. Under the best of conditions this method is a gamble, and it is believed that if more attention is paid to the early preparation of the seed-bed it will not have to be resorted to.

### **Depth of Planting.**

In all probability more loss occurs in the cotton-growing industry in Queensland through the lack of proper stands than by any other cultural factor. Without a full stand the grower cannot receive the proper benefits of his labours, no matter how skilful a grower he may be. It therefore is most important that every effort should be made to obtain as near a perfect strike as possible.

One of the main causes of failure in securing a proper strike is the incorrect depth of planting. In average soils and under the climatic conditions which usually exist in Queensland at cotton-planting time, sound seed covered to a depth of  $1\frac{1}{2}$  inches in a moist, well-prepared seed-bed should give an excellent strike unless heavy crusting rains occur before the seedlings come through the surface. When such storms occur it is advisable usually to harrow the land thoroughly and replant rather than wait for the first planting to come through.

Examinations of scores of fields where irregular germination was occurring have shown that it is very seldom that the seed is at fault, but that the depth of planting has been non-uniform. The result has been a series of gaps in the rows, of variable distances in length. In most cases where the seed-bed had been well prepared the fault has been too deep a covering, as shown by the young seedlings having died just before the seed-leaves pushed through the surface. A cotton seedling is only capable of pushing up through a certain depth of soil, and will die unless it gets through this soil in the proper time, even if fully developed. Frequently very pale, yellowish green, small-leaved seedlings may be seen in rows which have been covered by some form of scrapers to ridge the soil over the seed. Examination often shows that these seedlings are of exceptional length between the top lateral roots and the seed-leaves, which indicates that the seed was at too great a depth under the surface.

Generally speaking, the depth of covering is usually too great, especially in the early plantings. In nearly every field one can see instances where the seed which spilled out of the hoppers at the ends of the rows has been the first to germinate. This affords an excellent illustration of the results to be obtained by shallow planting in a firm soil, and should be ample evidence of the necessity for the preparation of the seed-bed so as to approach similar conditions.

### **Seed Rate of Planting.**

The average grower does not plant enough seed to insure that a good strike will be secured. This has been brought about by several factors, all of which are non-operative at present with the main supply of seed, and the practice should be discontinued in favour of heavier planting rates. When the increased interest in cotton-growing first assumed considerable proportions, it was necessary to restrict the planting rate owing to the limited amount of seed. This condition was improved somewhat in later years, but with the development of the Durango variety it was necessary to decrease the planting rate from 12 and 15 lb. to 10 lb. of seed per acre owing to the limited amount of seed.

The growers, under favourable planting conditions, were able to obtain good commercial strikes with such planting rates. This, in conjunction with the fact that they were learning the necessity of spacing the plants farther apart in the thinning operations, and thereby necessitating the removal of large quantities of plants, caused the growers to think that 10 to 12 lb. was a sufficient rate of planting. Under suitable climatic, soil, and cultural conditions a good strike may be obtained with this planting rate, but the absence of any of these factors may affect the germination to such an extent as to prevent the grower from obtaining the full returns which his soils are capable of producing.

The experiences of the Government Experimental Stations have been that, while under favourable conditions a good strike may be obtained from a planting rate of 10 lb., it is of decided advantage to



plant 20 lb. per acre. The extra amount of seed insures that a strike will be obtained which will enable nearly a perfect stand to be left in the thinning operations. This is especially true where heavy storms occur just before the seedlings push through the surface. The larger amount of seed gives the necessary thrusting power to break any crust which may form, whereas with the lower planting rate it is only where there are bunches that there is sufficient power to push through in case of a crust forming.

A planting rate of 20 lb. of seed to the acre gives a strike which may seem to be entirely unnecessary and which will entail considerable work in the thinning operation. It is believed, however, that it is far better to have such a strike which requires considerable thinning and allows a perfect spacing of the plants, than to have a patchy stand which requires but a small amount of work at thinning and does not return the maximum yields through lack of the proper number of plants. It has been found that in some seasons cotton seed is badly damaged by sucking bugs, and when used for planting the following season germination is poor. (*See Part II., plate VI.*) This also adds to the necessity for a heavy planting rate.

### Time of Planting.

The consensus of opinion amongst the growers and the results secured in experiments on the Experimental Farms all seem to agree that early planting is desirable. By early planting it is meant that planting should be done following the first rains falling after the soil has warmed sufficiently to maintain a growth of the seedlings, and that usually there will be no danger of frosts being experienced. In most of the cotton areas of Queensland this condition generally occurs by the middle of September, although in a few of the inland areas of some altitude the end of the month may be more suitable. Planting can continue on until the end of the first week in November if the moisture conditions are favourable, and good yields may be secured. After this period the yields decline rather rapidly with the later planted crops. This is especially so in the inland areas, as shown by the time of planting experiments at the Government Experiment Stations in the season of 1924-25.

YIELD OF GOOD-QUALITY SEED COTTON PER ACRE.

	Planting in—				
	September.	October.	November.	December.	January,
	lb.	lb.	lb.	lb.	lb.
Monal Creek Demonstration Area	2,184	1,543	1,120	Not mature	Not mature
Callide Cotton Research Station	..	912	885	220	Not mature
Callide Cotton Research Station, 1925-26	..	..	933	116	..

In the regions where frosts do not occur until July or August and then of only a light intensity, December plantings may yield satisfactory returns, but they rarely compare with those obtained from the earlier plantings.

The reasons for the earlier plantings yielding better than the later ones appear to be that the plants of the September and October plantings make a slow growth until the December rains begin. Apparently the cool nights which usually occur during this period of the year and the dry weather of October and November tend to restrict the development of the plant so much that it becomes of a toughened woody nature rather than of a succulent one. An excellent tap-root is developed as well, which enables the plant to withstand periods of drought later in the season. The plant develops a fruiting rather than a vegetative system under such conditions, and the December rains seem to stimulate the growth of the fruiting structure more than a tendency to vegetative development, even under the occurrence of fairly heavy rainfall. Apparently, once having developed this form of structure, very unusual conditions are necessary to affect it, and, while heavy rainfall may cause the development of a large plant, there is a corresponding amount of fruit borne, so that the larger plant really means a greater crop of bolls.

This feature does not hold true with the late-planted cotton. Usually only a short period of growth occurs before the beginning of the December rains. Consequently the plants are of a semi-succulent nature and the occurrence of the rains intensifies this condition. The result is a rapid growth of an elongated nature both in the main stalk and in the fruiting branches. A vigorous development of vegetative branches usually occurs, which is detrimental to any lower crop of bolls which may be present, owing to the excessive shade which is caused by the increased number of vegetative branches and the size of the leaves thereon. Unless a plant of such nature receives a very severe check by drought it is extremely unlikely that any but a very late top crop will be realised.

Such plants are also more subject to attack by such insects as the corn ear worm (*Heliothis obsoleta*). This insect apparently prefers the young squares of the late-planted crop to that of the earlier-planted cotton. As the appearance of the heaviest emergence of the grub of this insect occurs at the most critical stage in the development of the late-planted cotton, i.e., around the middle of January, it can be seen that an added danger lies in growing such a crop.

The season of 1926-27 has given some results in late-planted cotton which may be of decided value. In this season most of the growers in the Callide and the Dawson Valleys could not obtain stands of cotton until the middle of December. Ordinarily crops planted in this period of the season would have returned very little yield. Such was the case in crops planted on alluvial soils—that of the Callide Research Farm yielding practically nothing. The growers who planted on the



clayey loamy soils, where the box-tree clay flats and the alluvial loams intermingle, obtained as much as 700 lb. of cotton to the acre. The explanation seems to lie in the fact that such heavy rains fell in January that the pores of the soil became waterlogged, thus causing a "physiological drought" effect on the plants. The result was a decided checking of the growth of the plants, and after a two weeks' heat wave in February the resumption of heavy rains produced a very good crop of cotton rather than a rank vegetative growth as might have been expected. This phenomenon should be borne in mind, and all growers should experiment under as nearly comparable soil conditions as possible in case a similar situation arises again.

### Spacing of Rows.

There is no definite data from which to determine the correct distance to space the rows. In the earlier crops of the period from 1919 on, the general practice was to plant the rows 4 ft. apart. The experiences of the growers were that on most soils this distance was somewhat unreliable. In seasons when heavy rains fell during December and January, such a rank growth of plant was liable to develop that the space between the rows was entirely grown over. The sunlight under such conditions could not penetrate through the luxuriant foliage sufficiently to prevent excessive humidity existing around the lower portions of the plants. The result was severe losses of the lower crop due to external boll-rots.

In an attempt to overcome this condition, the space between the rows was widened to various distances varying from 4 ft. 3 in. to 6 ft. A majority of the growers have decided finally that  $4\frac{1}{2}$  ft. seems to be the most suitable for average conditions, and the bulk of the crop is planted accordingly with such spacing. The yields obtained and the quality of the cotton produced indicate that this space for the average conditions of the Cotton Belt may be relied upon ordinarily to give good results, other factors being normal.

It may be that certain soils will require different spacing. A method is being investigated at the Callide Cotton Research Station in which the "outside row effect" is incorporated. Usually the outside rows of a plot of cotton yield heavier than do the inside rows. In the United States, this factor has been recognised and has been obtained throughout the field by means of planting the rows in pairs in which the distance between the two rows of a pair is somewhat less than that between the pairs. The use of this method has been found to be of advantage in controlling the growth in irrigated cotton fields where boll-rots may cause serious losses.

Such a system may be of advantage on some of the rich alluvial soils of Queensland in districts where heavy rainfall may occur in January or February. Experiments are being conducted along these lines using distances of  $4\frac{1}{2}$  ft. between the two rows of a pair and  $5\frac{1}{2}$  or  $6\frac{1}{2}$  ft. between the pairs. No uniform results have been obtained to

show that there is any advantage to be gained by such spacing. It is suggested that the growers who have soil and climatic conditions where this method may be of advantage should experiment along such lines in order to determine the value of such for their particular soils.

### CULTIVATION.

The operation of cultivating a cotton field does not receive always the amount of attention that should be given to it. This is not an expensive operation if properly done, yet the number of times that a cotton crop has to be cultivated in a season makes it necessary that each cultivation should be as efficient as it is possible to attain. One frequently sees machines equipped with the wrong points or ones requiring sharpening, &c. Attention to such details often reduces the cost of production to a marked degree, and it is stressed that the grower should study his machine and see if it is properly equipped before using it.

The most efficient cultivation can be obtained with the riding two-horse cultivator which is steered by the driver. In such an implement the carriage on which the points are fastened works independently of the main structure of the machine. Instead of controlling the carriage by directing the horses, the steering is done directly by the driver in conjunction with the horses, through control of the wheels or of the carriage itself. There are several types of this form of cultivator on the market, and the growers should investigate them and see the advantages to be obtained by using them.

Usually such machines are adaptable to the use of disc attachments, hillers, duck feet, or sweeps of various sizes and the ordinary tines. All of these points, with the possible exception of the discs, are required in the average field of cotton, and to attempt to cultivate a crop without them usually means that at some stage in the operations an inefficient cultivation is made. These points can be used on the one-horse scuffler as well and to some extent on the combination planter-cultivators, but neither of these machines, of which there are several types, allows the careful work close to the plant that the above-mentioned type of cultivator will do.

It is the degree of efficiency with which the cultivation close to the plants is made that controls the amount of hand labour that has to be used in growing a crop of cotton. Where the inner points of a machine cannot be put close enough to destroy most of the weed growth around the plants, an extra charge is incurred through the necessity of employing hoe labour to perform the same. As an acre a day is average hoeing, it can be seen that such inefficiency in the cultivation is decidedly expensive. This is especially so in seasons where showery conditions exist in the early part of November, when the plants may not be tall enough to withstand very much soil being worked to them.

The first cultivation should be made soon after the row of young plants is discernible, as this creates a mulch around them and also destroys any young weed growth which may be forming. Usually



this is all that is necessary until the thinning is performed, when another cultivation should be given to work back to the plants the soil which may have been removed in the thinning operations. From this point on, only sufficient cultivation to keep down weed growth and provide ample mulch to maintain moisture is required. Generally speaking, four or five more cultivations will be required after this before the last cultivation, when the crop is "laid by" with the riding cultivator. In each operation the soil should be worked to the plants so as to form a good mulch around them and also to smother out any weed growth which may be developing in the row. At the last cultivation the soil should be well ridged around the plants, so as to brace them against the force of any storms which might occur later in the season when the plants are heavily laden.

Cultural methods used at the Cotton Research Farm seem to indicate that it is advisable to continue the cultivation between the rows until late in the season. For this purpose a one-horse scuffler, equipped with long traces and a short spreader behind the horse, is used. Hessian is wrapped around the ends of the spreader so as to prevent catching and breaking of the branches. This cultivating assists in preventing any weed growth from developing in the "middles" and also maintains a moisture-retaining mulch during the period when the upper crop of bolls is developing. It is believed that this extra cultivation, especially in droughty periods, assists in the development of these bolls and enables a better class of cotton to be produced in this portion of the crop.



PLATE 120.

Illustrating the use of recommended types of cultivators—in clay soil following a rain. (Young beans in foreground.)



## THINNING.

### Distance between Plants.

In a country where cotton-growing is comparatively new and the seasons are variable, it is difficult to arrive at the correct manner in which to thin the cotton crop. At the beginning of this recent revival of cotton-growing in this State, there were tried many methods of spacing of the plants, heights of thinning, &c. Varying results were secured, but, by a process of experimentation and elimination, the majority of the growers seem to have arrived at the conclusion that the plants should be spaced from 18 to 24 in. apart, depending on the soil and climatic conditions.



PLATE 121.—A WELL-CULTIVATED FIELD OF YOUNG COTTON.

Many growers at first endeavoured to follow the system of leaving the plants close together, which has proved so successful in the U.S.A. cotton crops. Very poor results were obtained from such methods, both in regard to yield and the quality of the fibres produced. The explanation lies in the fact that the winter rainfall is so light that there is no possibility of having a "season in the ground" as does the American cotton-grower, who often has to delay planting preparations on account of wet soil. Usually the Queensland cotton-grower plants following the first light showers, when there is just sufficient moisture in the top soils to carry the crop to the flowering period. Unless good rains fall then a marked reduction in the yield may result and frequently the quality of the fibres will be decidedly affected. It can be seen, therefore, that the problem of the Queensland farmer is to determine methods of combating semi-droughty conditions in the early period of



the plant's development and possibly severe droughty ones in the later periods. In some seasons this may be changed to heavy rainfall conditions in the later period of the plant's development.

Experiments conducted by the Department of Agriculture and Stock in conjunction with farmer co-operators and on the State Experimental Farms indicate that a spacing of 20 in. apart on the average soils gives very good yields in properly grown fields. This may be modified according to soil conditions, as it appears that, on the less fertile soils of the hilltops and upper slopes, a spacing of 18 in. apart is suitable, while the rich alluvial loamy creek soils require the plants at least 24 in. apart. There is no fixed rule in regard to this point, and each grower has to find the proper spacing for his own particular soils. It is suggested, however, that the aim should be to ascertain the distance which will give the most insurance of obtaining a profitable crop under variable conditions, rather than to hope to get in each year the highest possible yield which the soil is capable of producing.

### **Height of Thinning.**

The proper height at which to thin the plants is very important under Queensland conditions. A large percentage of the cotton-farmers are growing this crop in conjunction with dairying, and often with a limited amount of labour. Under such conditions only a certain amount of time is available each day for the thinning of the crop. It becomes very necessary, then, for the grower to anticipate the behaviour of the plants, in order to complete the thinning operations before any material damage has been done through overcrowding.

Experiments seem to indicate that the ideal time to thin in the average crop is when the plants are 6 to 8 in. in height. A plant thinned at this height, especially when in a good strike, is less likely to develop excessive vegetative characters after thinning, and also escapes the development of any spindly growth. The longer the thinning is delayed, the more likely is the plant to become of an elongated appearance with practically no bottom crop.

It can be seen, then, under good growing conditions, that a grower may not be able to cope with the situation if he waits until the average of the plants is 6 to 8 in. in height before commencing to thin. It is suggested that in such circumstances it is better to commence operations when the plants are from 4 to 6 in. tall, as this is the easiest height at which to thin, and this will enable the speeding-up of the work. It is advisable, however, if the operations cannot be completed before the last of the unthinned portion of the field is over 12 in. in height, that extra labour be employed.

### **Method of Thinning.**

Thinning, or "chopping" as it is often called, is best accomplished with the use of a light garden hoe. This implement allows the chopper to make quick and careful strokes, and does not cause so much strain on the forearms as does the heavy "chipping" eye-hoe which is generally

used on the farm. Proper care should be taken to adjust the handle of the hoe to suit the user's height, reach, &c. The blade of the hoe should be set so as to give a cutting stroke rather than a flat scraping one, as the latter is more conducive to splitting the stalk and necessitating a second stroke. A set of the blade suitable to a short man may be entirely unsatisfactory to a tall man, &c., so that it can be seen that a decided increase in efficiency with the same amount of effort may be obtained if the use of the chopping hoe is carefully studied. The edge of the hoe should always be kept sharp by means of a flat file, and a few strokes at the end of the row help to keep the edge in good cutting order.

With a properly adjusted garden hoe an experienced "hand" can chop 3 acres a day on land that has been properly cultivated to destroy weed growth along the sides of the rows. Under the Queensland conditions it is believed that a man should do an acre in the usual time that a farmer who is dairying can spend in the cotton field in a day. This should be increased considerably where the full day is spent in the field, as the wider-spaced rows in the cotton fields in this State mean a considerable reduction in the row footage in an acre, to that which is used in the cotton fields in U.S.A. There  $1\frac{1}{2}$  to 2 acres a day is very ordinary chopping for such conditions as exist here.



PLATE 122.

Illustrating the height of the Plants when thinned at the Callide Cotton Research Farm.  
These plants average about 6 inches in height.

When chopping out the cotton it is not necessary to dig deep into the ground in order to insure that the plants will not sprout again. As long as the hoe cuts below the point at which the two seed-leaves occur, there is no likelihood of any further growth. This eliminates the using of so much extra force to the stroke and also speeds up the whole operation. It also reduces the amount of loss of surface moisture which occurs where the hoe digs into the ground to such an extent as to remove all mulch between the plants.



### PICKING.

In normal seasons picking usually commences during the latter part of February and continues on until the end of June, or, in the case of late-planted cotton, the end of July. In determining when to begin picking, the grower should take into consideration if the cotton is thoroughly mature, and if there are enough open bolls to allow a picker to make a satisfactory day's tally. Generally it may be taken that when there are 10 to 15 open bolls per plant these conditions exist, and picking should commence.

Given a well-grown crop of a good stand, with 10 to 15 properly open bolls per plant, an inexperienced picker should soon be able to average a daily pick of 100 lb. or more of seed cotton. In several of the districts it has been usual for the more experienced pickers to average 150 lb. and upwards, and it is anticipated that this figure will be consistently raised as the pickers become more accustomed to this operation and the growers more proficient in the production of the crop.

The Department of Agriculture lays particular stress, in the cotton-breeding operations, in endeavouring to increase the size of the boll and the suitability to rapid picking. It can be expected confidently that the rate of picking will be increased materially through the above-mentioned factors.

### Methods of Picking.

The actual operation of picking is best performed by using both hands. At first this appears to be somewhat awkward, but as one becomes more experienced the increased ease of picking with both hands greatly assists in increasing the day's tally. Some pickers prefer to pick directly into a chaff-bag hung in front of them from the waist. This reduces the amount of movement necessary to get the cotton to the sack and certainly speeds up the picking. Others prefer kerosene tins, &c., especially in the taller cottons. All may suit their taste, but the point to remember is to eliminate all waste movements and thus increase the efficiency of the operations.

Care should be exercised to avoid picking leaves, trash, or diseased cotton, as these factors play an important part in determining the grade of a cotton. One frequently finds in picking a boll that part of the seed cotton sticks in the base of the open burr. It is better to leave this than go after it again. Not only is time lost in picking it out but the quality of the cotton is generally low, being of a brownish-stained tinge and often having weak and short fibres. Consequently the grade of the rest of the boll will be lowered by the inclusion of this remaining portion.

Cotton should not be picked and packed when it is wet. If showers or light rains occur the pickers may be allowed to start when the cotton is still damp, but such cotton should be spread out and thoroughly dried in the sun. Wet cotton gins badly, and is penalised by the buyers owing to the increased amount of waste.

Observations of inexperienced pickers in good crops during the past seasons have shown that the causes of their obtaining low tallies were due to the lack of observance of the abovementioned details. It is believed that, if more attention is paid to the methods of picking, the average picker will be able to increase considerably his daily tally.

### FORWARDING COTTON TO THE GINNERIES.

Most of the cotton in Queensland is forwarded by rail to the ginneries, which are located at railway centres so as to serve many areas. This necessitates packing the seed cotton in suitable containers, and the ones most commonly used are wool-packs and chaff-bags. Carefully packed, from 450 to 500 lb. of well-grown seed cotton can be pressed into a wool-pack and from 70 to 80 lb. in a chaff-bag. Frequently much heavier weights are packed in each, but it would facilitate ginning if these growers would endeavour to standardise on the abovementioned amounts. Three 500-lb. wool-packs or nineteen 80-lb. chaff-bags make a nice style of bale of lint. It can be seen that, if all growers forwarded their cotton in such multiples, a much more uniform lot of bales could be ginned than where extremely varying amounts are forwarded.

In packing the containers it is desirable to include a uniform grade and staple of cotton in the one container. This assists in the grading operations, and helps to insure that the grower gets the proper price for his cotton. Uniformly packed containers also greatly assist in the ginning operations, as the packs can be more nearly matched prior to ginning, which insures a more uniform class of lint being enclosed in the one bale.

The grower should thoroughly blend the various pickers' cottons before pressing into the wool-pack, as this prevents dangers of "plates" of different grades occurring in the pack. As the prices paid for a bale of lint are based on the lowest grades contained therein, it becomes necessary to pay advances to the growers on this basis. By blending, the danger of "plates" can be obviated and a much more uniform bale delivered. Care should be taken to blend only somewhat similar grades of cotton. Where badly stained or immature cottons are produced, it is to the interest of the grower and the industry as a whole that such cottons be segregated from the higher grades of mature cotton.

Each container should be branded with the grower's initials, address, and Cotton Pool Board's registered number. This not only assists in identifying the containers as they arrive at the ginnery, but is of great help in facilitating the returning of the empty wool-packs to the proper owners. A charge of 6d. per wool-pack is deducted from the grower's initial advance to cover the cost of returning the same. Every wool-pack is subjected to sufficiently high temperatures to kill all insect life which may be in the lining; this prevents the spreading of pests such as the pink boll-worm into clean areas.



### GRADING.<sup>2</sup>

The containers upon arrival at the ginneries are opened and sufficient cotton is examined for the grade and length of fibre or "staple" to be determined by the Government grader in charge of the operations. The cotton is then weighed by an official of the Cotton Pool Board and a representative of the Commonwealth Government and stacked in the proper place in the large seed-cotton house of the ginnery. Each grade and staple is ginned separately, and the feeder pipe to the gins is fed from the contents of three wool-packs at a time in order to secure blending. If the grower has properly blended the pack a fairly uniform grade and style of cotton is fed to the gins, but where plates of mixed grades occur in the wool-pack considerable loss of time is often encountered in endeavouring to mix the cotton at the suction spout.

Each bale of lint is sampled twice during the process of ginning in order that a representative sample may be obtained. These samples are classed by the head Government grader against standards of Queensland lint cotton which have been prepared in comparison with the World's Universal Standards for American Upland cotton. The latter standards are established each year by the United States Department of Agriculture.

The Queensland seed cotton grades are based on these standards as well, so that exceptionally uniform bales of lint as regards the grade of the cotton are the rule. As pointed out, if the growers will assist by blending the contents of each wool-pack a very high standard of uniformity of grade may be maintained.

### GINNING.

The ginning of the Queensland cotton crop is performed by a commercial ginning company. This organisation, under an agreement with the State Government, undertook to erect ginneries and oil-mills sufficient to serve the industry when the present revival of the cotton-growing industry was inaugurated in 1919. Ample modern ginneries of the saw-gin type and one oil-mill have been erected. During the first season since the conclusion of the system of Government control of the industry, the Cotton Pool Board has arranged with the company to gin the entire crop.

The practice of ginning all the crop at properly located central ginneries under one authority is of the utmost importance. Such a system greatly reduces the ginning charges and materially increases the efficiency of the grading and the ginning. The experiences of all other countries where small, individual, privately owned ginneries are maintained tend to show that it is extremely difficult to maintain a high standard of ginning. Every care has been exercised during the period of Government control to develop a high standard for the finished product, and it is to be hoped that this will be maintained.

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<sup>2</sup> Full information relating to the grading of the Queensland cotton crop is published in "Cotton Classing," by L. L. Gudge, Head Government Grader.—Extract from the "Queensland Agricultural Journal," June 1927.

### MARKETING.

The marketing of the cotton crop is controlled by the Cotton Pool Board, a body elected by the growers to handle the cotton-growing industry. This organisation came into effect upon the expiration of the period of governmental control which took place at the end of the 1925-26 season. The cotton areas are divided into electoral districts, each of which sends one representative to the Board. The Government is represented by the Director of Marketing. The Board deals with all matters pertaining to the distribution of the planting seed, the receiving, ginning, financing, and marketing of the crop. A permanent office is maintained at Whinstanes, near Brisbane.

The Board pays all expenses of the crop from the time the consignments of seed cotton are placed on rail, with the exception of the grading, which is done by the Government. Upon the grading and weighing of the cotton at the ginneries, advances on a graduated scale according to grade and staple are forwarded to the growers; these advances approximate from 60 to 75 per cent. of the estimated value of the lint cotton. Upon the completion of the sale of the entire crop all expenses are deducted, and any surplus remaining is distributed pro rata per pound of seed cotton.

This entails a considerable delay in the grower receiving the full value of his cotton, but it is believed that such a system is the most advantageous that can be used in disposing of the Queensland cotton crop. The Pool Board sells the bulk of the lint cotton direct to the mills, which not only eliminates the charges of brokers, agents, &c., to the grower but enables the mills to obtain their requirements at the minimum expense, thereby allowing better prices to be paid to the Board.

### PURE SEED SUPPLY.

The control of the pure seed supply is vested in the Department of Agriculture and Stock through legislation enacted with the approval of the Cotton Pool Board which represents the cotton-growers. This legislation empowers the department to have full control over the growing, the distribution, the fumigation, and the supervision of the ginning of all cotton seed required for planting purposes, and the testing of varieties of cotton. This authority is vested in the department in order to insure the continuity of the plan of pure seed control which was instituted when the industry was under the system of the Government-guaranteed prices, in which the Government acquired all seed cotton raised in the State.

Under the plan instituted by the department, the Cotton Belt is divided into several districts. In each district a system of developing supplies of seed is in force which aims to provide sufficient seed to meet all the requirements of that area. This supply of seed is bred up by means of a system of bulk selecting large masses of plants of a single type which is thought the most suited to the district. The seed from



these is increased until sufficient to meet all the requirements. It is apparent that such a system requires a fresh supply of selected seed each season, but it is a method of preventing any marked deterioration taking place within the variety, and if properly done will enable a good class of cotton to be produced.

The system of individual progeny selections is also carried out in each district, whereby the purity of the progeny of any one plant is determined before any bulk increase of the seed is made. Under such a method a considerable length of time may be required before a pure strain of sufficient merit to warrant general distribution is obtained. It can be seen, therefore, that the bulk selection method has an important place in the seed supply system, as it provides a good commercial cotton while the plant breeder is endeavouring to develop a pure strain from a single desirable plant.

Each season certain areas in each district are designated by the departmental officers as having the best-grown cotton from which to obtain the supplies of planting seed. All seed cotton required from these areas is sent to the ginneries under proper identification marks, where it is segregated according to districts and ginned separately. The seed from this is separately treated in Simon's Heater at a temperature of 60 to 65 deg. C. for any possible pink boll-worm or other insects, and then sacked for distribution in the particular district from which it came. Germination tests are also made to ascertain if the seed is thoroughly suitable for planting purposes. The grower can see, therefore, that every effort within the present means of the department is being made to provide him with the most suitable seed of the variety of cotton thought best suited to meet his conditions.

### **ONE-VARIETY COTTON-GROWING.**

It is believed that every effort should be made to keep Queensland on a "one-variety" basis if possible. The general trend of opinion amongst the cotton authorities of the world favours the growing of as few varieties as possible in a country and only the one variety in any particular district. The benefits obtained from such a system react not only on the grower but also on the spinner and the consumer of the manufactured article. This fact is becoming more appreciated each year, and especially in Egypt and the U.S.A. has marked progress been effected along these lines. In the State of California, U.S.A., the Association of Cotton Growers has set an excellent example for cotton-producing countries to follow. They have asked their State Legislature to pass a law making it a penal offence for anyone to grow any cotton other than the authorised variety for that district. They also have developed a system to supply pure planting seed which functions under the control of the association and the State and Federal Departments of Agriculture, so that the growers can be assured always of good seed of the best variety suited to their district being supplied to them.

A district growing only the one variety of cotton is benefited in that the purity of the planting seed can be maintained to better advantage, the problems connected with cultural practices become easier to solve, thereby increasing the general standard of production, the operations relating to picking and ginning are simplified and performed more efficiently and economically, and the average quality of the crop is more uniform and of a superior standard. These factors are all instrumental in increasing the value of the cotton crop to the grower in that the general improvement in all of the operations, due to the uniform variety, assists in reducing the cost of production, and the high quality of the lint induces buyers to pay premiums for it.

The cotton-grower can thus appreciate why the Department of Agriculture is endeavouring to breed up strains in each district which will enable all of the growers to obtain profitable returns and still keep the State on a one-variety basis. It is realised that the variety which



PLATE 123.

A "bulk selected" breeding plot of the Durango variety of Queensland Upland Cotton, grown in 1926-27 at the Callide Cotton Research Station. This plot yielded at the rate of 1,708 lb. per acre of seed cotton of a staple length of a full  $1\frac{1}{8}$  inches.

is being grown at present may not be the most suitable although excellent results are being obtained from it. Breeding plots and variety tests of other varieties which may be suitable to Queensland conditions are being grown under the proper isolated conditions. It is anticipated that this very important problem will be solved when sufficient time has elapsed to enable the proper amount of data to be collected from these experiments.



### THE STATE OF THE INDUSTRY.

It may be stated that the cotton-growing industry in this State is in a stage of transition between a system of assistance under governmental control and unassisted control by the growers. The system of governmental guaranteed advances during the period of 1919-26 was designed to enable the growers to learn the fundamental principles of cotton-growing. Under such an arrangement the growers were assured of such prices that they were able to experiment with the growing of the crop on all sorts of soils and at long distances from the ginneries. This enabled an excellent opinion to be formed regarding the nature of the soils and the various districts in which cotton-growing was likely to be successful.



PLATE 124.—A FIELD OF DURANGO COTTON IN THE CALLIDE VALLEY IN 1926-27.

This valley is in one of the Government Land Settlement Schemes. In 1923 this was a cattle station carrying about one beast to 10 acres of country. The photograph shows the wisdom of closer settlement. Cotton-growing has brought several thousand acres under cultivation in this and the Upper Burnett Land Schemes, and it is believed will be the means of making them into prosperous agricultural districts.

At the termination of the period of guaranteed advances, the growers requested the Commonwealth Government to grant a system of bounties on seed cotton for a term of years. It was felt that the industry had not reached a stage where it could continue without some assistance. While large numbers of the growers were producing splendid yields of cotton, the average yield per acre was still low. Many growers had developed systems of farming whereby they obtained yields of 700 lb. or better of seed cotton per acre each year. Under favourable circumstances these yields reached as much as 1,500 lb. of seed cotton of excellent quality per acre, and results as high as 2,184 lb. per acre

had been recorded. It was realised, however, that there was much to learn in the finer details of growing the crop. The Commonwealth Government, realising the importance of developing the industry, accordingly granted a bounty of  $1\frac{1}{2}$ d. per lb. on the better grades of seed cotton, and  $\frac{3}{4}$ d. on the lower grades, for a period of five years, starting with the season of 1926-27.

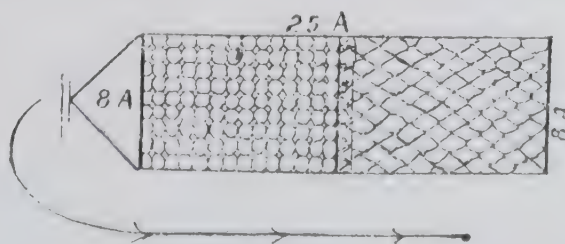
In conjunction with this bounty it was decided to develop a cotton-spinning industry in Australia. It was realised that the best markets for Australian-grown cotton would be in this country. As Australia annually imports some £15,000,000 sterling worth of cotton goods, it was believed that an industry could be developed which would eventually rank of great importance. This, then, would afford the outlet for large quantities of Australian-grown cotton. Accordingly a graduated bounty varying from  $\frac{1}{3}$ d. to 1s. per lb. of yarn manufactured in this country, providing it is composed of one-half Australian-grown cotton, was granted in conjunction with the bounty on seed cotton.

The growers, have, therefore, this period of five years in which to refine their methods of growing cotton. The State Department of Agriculture is assisting in determining the proper methods by annually conducting large numbers of experiments with grower co-operators and on the Cotton Research Farm. Every effort should be made by all farmers in the cotton areas to grow as much cotton as they can properly handle. With a cotton-spinning industry practically assured in this country, an excellent future for cotton-growing awaits the farmers in those portions of this State where cotton can be grown successfully. The point to remember is that sufficient cotton should be produced to meet a considerable proportion of the spinning mills' requirements if the full value of the opportunity is to be realised.

[To be continued.]

### BRUSH SLEDGE.

The accompanying illustration shows a boat or sledge for carting prunings and other rubbish to the fire heap. The description is as follows:—Take two strips of woven-wire fencing about 4 feet wide and 25 feet long. The length depends upon the size of the load to be hauled. Lay the strips side by side and fasten them securely at certain intervals to prevent the brush from slipping between. Fasten each end and the centre securely to the two-by-fours. They should be on the upper side of the wire, so that the boat will glide smoothly over the ground, and take the entire strain. Attach the swingletrees to the two-by-fours at the front end of the



boat with a heavy twisted wire or chain. The boat is then finished and ready for service. Hitch the team to the boat, and drive between the rows of trees where the brush is to be picked up. The brush is thrown on from both sides and tramped frequently. When the boat is loaded drive outside the orchard to an open space, and dump the load. This is done by making a sharp turn and driving the team back alongside the boat, thereby unloading the brush and rolling it into a bundle for burning. The boat, of course, must then be turned right side up to keep the two-by-fours off the ground.—“Australasian.”





PLATE 125.—SCIENCE SERVES THE FARMER.  
Display by the Division of Entomology and Vegetable Pathology at the recent Gympie Show.

### AN AUTOMATIC GATE.

Travellers in horse-drawn vehicles who have ever regarded the opening and closing of gates as somewhat of a nuisance, now find when travelling alone by car that the inconvenience has increased owing to the impossibility of leading the car through the gateway as was done with the horse. Various contrivances have been adopted to obviate the necessity of alighting from a car when passing through a gateway, the most popular at present being a grid much similar to that in use at railway crossings.

The inventive genius of Mr. Jack Jones of Britannia Station in the Charters Towers District has evolved a gate that can be economically constructed, is as stock proof as any gate can be, and will open and close automatically to allow of the passage of a car or other motor-driven vehicle.

Referring to the plan, it will be observed that the weight of the car on the "run-ups" or ramps depresses them, causing the drum of the lifting gear, to the axle of which they are attached, to revolve, thereby lifting the gate to a height of 8 ft., and maintaining it at that height until the car has passed through and off the ramps on the other side.

In the original gates at "Britannia," old buggy wheels were used with sapling cross pieces to make the drum, while the other timbers necessary were cut in the bush close handy. The simplicity and efficiency of this kind of gate has impressed all who have seen it, and caused them to influence Mr. Jones to have an application made for patent rights.

In the near future, doubtless, a more or less elaborate structure will be on the market, but it is probable that those to whom such a gate makes an appeal will be able to construct gates themselves by the payment of a small royalty.—N. A. R. POLLOCK, Northern Instructor in Agriculture.

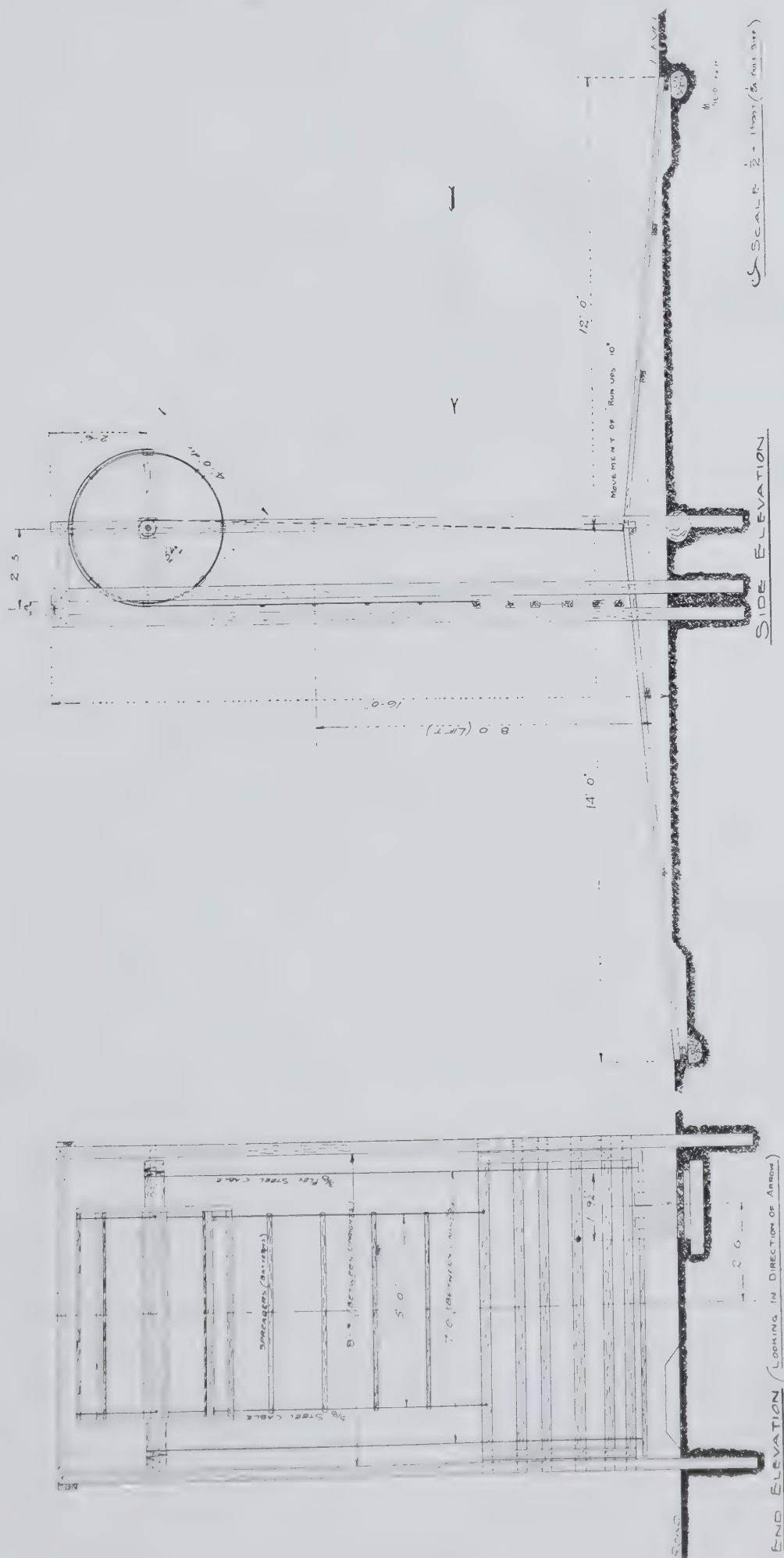


PLATE 126 —AN AUTOMATIC GATE.





PLATE 127.—MANDARINS FROM THE MORETON RED LANDS.

This remarkably fine cluster of Scarlet Mandarins, numbering 10 dozen in all, attracted much attention recently in the Roma Street Markets. For a second crop such a spray is very unusual. The quality also was good. The length of the cluster was 5 ft. It came from the orchard of Mr. James Collins, Redland Bay.

## THE FARMER AND HIS MARKET.

By A. M. MICHENER, Service Department of the National Bank of Commerce,  
New York.\*

Present hardships and discontent among farmers are not wholly the result of the war. In part they reach back to maladjustments evident before that conflict dislocated customary relationships and increased the economic strain. To a considerable extent they have their roots in a lagging adjustment of agriculture to improving technique in transportation and production. This lag was aggravated but not caused by the war. Nor is it peculiar to agriculture. Industry has been faced with similar developments; but because of inherent differences in its nature the problems of agriculture have been different and its response to conditions has been slower.

While in point of time development of transportation facilities has brought the farmer closer to his market, geographically it has carried him farther and farther from it. Even for perishables the significance of time and distance has been greatly reduced by refrigeration. These very factors which have enabled the farmer to reach more distant markets have made possible the expansion of those markets through concentration of industrial population, this in turn encouraging the use of more and more remote areas for agricultural production. The result has been to attenuate if not to destroy the farmer's contract with the consumer.

Not only was the field of competition extended by the opening up of new regions to commercial agriculture, but its force was intensified by improved technique of production, which tended to outrun increasing demand. To relieve this situation, the farmer is compelled more and more to turn his attention to distribution, seeking to cheapen the process, shorten the route, economically if not physically, and renew his contract with the consumer.

An essential step toward these ends is standardisation of products. In the common language of standardised grades is found the meeting ground with marketing agencies and consumers of which he has been deprived by geographic remoteness. Moreover, in standardised grades is found a meeting ground with other agricultural producers, affording the fundamental basis for competition. Through this medium the essential factors of a market can be brought together on a scale commensurate in extent with that of production and consumption without assembling those factors physically. The market can be brought to the farmer when he can no longer carry his produce to it.

While this step in distribution is being brought upon the farmer by the same economic forces that have induced manufacturers to establish a nationally advertised brands and trade marks and to put up package goods which are carried sealed from factory to consumer, the farmer's response has been somewhat different. In manufacturing industries these distributive devices have been made possible by concentration of management and by production in large scale units. Because of the nature of one of its raw materials, land, agriculture must remain relatively decentralised in operation.

Despite this fact there is some evidence of a tendency toward concentration of ownership and control in agriculture which may afford it a basis similar to that developed by industry. Alternative tendencies also are present, however. Many of the advantages of large scale organisation for studying the technique of production are already available to farmers through the service of Federal and State Departments of Agriculture and agricultural colleges and experiment stations. The growing use of this service by individual farmers is attested by improving methods and increasing efficiency in production. Benefits of grading and large scale marketing operations are secured in some instances by co-operative organisations among farmers. There remains for others, however, the need for control of quality and maintenance of standards such as are provided for manufacturers by large scale organisation.

A good beginning has been made in meeting this need through governmental agencies as research in production has been cared for. The position of such agencies as disinterested parties has been a great advantage in carrying forward the work and, in the case of the Federal Government, also the nation-wide scope of its activities. But a large field still awaits the initiative of the farmer in solving his problems of distribution.

The value of reliable standards for agricultural products was recognised long ago, even as it became manifest in industrial progress. But the difficulties were greater and the pressure toward it gathered less rapidly. In some agricultural lines the exigencies of the situation had brought action, either on private initiative or

\*In the "Commerce Monthly" for August.



through governmental agencies, even before the outbreak of the war. In the necessities of the war and in the depression following it the need was keenly felt, and rapid progress in standardising grades has since been made both by governmental agencies and by producers' organisations.

With a background of long study of the problem, the United States Department of Agriculture was in a particularly favourable situation to take immediate steps. Uniform and recognisable standards for farm products had been part of the Department's pre-war programme to improve the position of the farmer in marketing his produce. Moreover, they were a necessary adjunct to other parts of that programme—the market news service and the establishment of accredited warehouses whose receipts, as collateral, would aid the farmer in securing better terms for credit. The Department is responsible in large measure for the wide spread of the movement toward standardised grades and for the rapid advance that has been made in recent years.

### Grades Now in Use.

Standards covering at least certain characteristics are now in use, officially or tentatively, for such commodities as cotton, wool, and tobacco, for the main commercial dairy products, grain, broom corn, hay, soy beans, the principal fruits and vegetables, and the more important kinds of live stock and meats. Tentative grades have been prepared for honey, and work is progressing on standards for oil content of cotton seed.

These grades are by no means all on the same basis of authority, nor have they reached the same degree of acceptance and use. But already they have brought improvement in the ease of marketing and distribution. They are particularly serviceable in the trade, requests for them frequently originating there. Retail sales are still largely on the basis of direct and unaided inspection by the purchaser. At the other end of the line, the farmer still has in many cases rather limited direct access to Government inspection and grading. But even through indirect contact they have demonstrated in striking fashion their value to him, thus paving the way for further progress.

The official grades so far worked out do not attempt to cover all points of quality in the product dealt with, but rather to set up standards for those characteristics which may be readily determined on a commercial basis. For example, potatoes are classed in their grades according to similar varietal characteristics, size, freedom from freezing injury, soft rot, damage caused by dirt or other foreign matter, sunburn, second growth, growth cracks, hollow heart, cuts, scab, blight, dry rot, disease, insects, or mechanical or other means. To allow for slight variations a certain tolerance is permitted from these specifications.

While these grades give no assurance beyond varietal similarity as to the internal quality of the potatoes, they do give definite standards for measuring the external characteristics and condition of a shipment. The standards are readily applied and are objective, so that individual judgment and bias play a minimum part in their application. The grading of a lot is based upon sampling, and here care must be exercised to secure a representative sample. Not all commodities lend themselves to purely objective standards. Butter and cheese require the use of taste and smell; but, as far as possible, official grades are designed to eliminate the personal factor. Even descriptive terms are carefully defined.

In working out standards the usual method of procedure is for agents of the Department of Agriculture to prepare tentative grades based on the usage of the trade throughout the country. Efforts are then made through hearings and otherwise to ascertain the reaction of interested parties—producers, traders, consumers—to these grades, and finally to arrive at a system of grades that will be acceptable to all interests. Mostly they are used experimentally for a period by the Department and even in commercial transactions. When what appear to be satisfactory grades have been arrived at, they are promulgated as official United States grades, although still further amendment can be and often is made.

For some commodities official grades have been made mandatory under specified conditions, but in most cases they are permissive—that is, the service of inspection and grading is available to interested parties upon the payment of a small fee. Where States have regulatory laws, United States standards are frequently adopted as the official State grades, and are even made mandatory as far as the authority of the State extends. It was reported in the fall of 1926 that altogether thirty States had officially adopted one or more of the United States standards for fruits and vegetables.

The two important cash crops, cotton and wheat, have been provided for by special laws, which afford the legal basis for United States standards and which

make those standards mandatory under prescribed circumstances. The remaining official standards have been established under three general enabling Acts—the Warehouse Act, the Food Production Act passed during the war, and its successor in annual Appropriation Acts providing for the continuance of the inspection service begun under it.

### Standards for Grain.

Following upon the establishment of cotton grades, the Grain Standards Act was passed in 1916, making the use of official standards when they had been promulgated mandatory for all transactions in interstate and foreign commerce except those by sample. Under this Act grades were established for shelled corn in 1916, for wheat in 1917, for oats in 1919, for rye in 1923, and since that time for grain sorghums, feed oats, mixed feed oats and barley. Standards for milled rice and rough rice have been recommended and are used as a basis for trading, but have not been made official and are not under Government inspection.

Wheat grades are based upon such measurable physical characteristics as test weight per bushel, moisture content, proportion of damaged kernels, foreign material other than dockage, and wheats of other classes. Grade specifications for other grains are of the same general type. Methods of making the tests are prescribed and numerous devices have been worked out to aid in their speed and reliability.

The official grain grades have gained wide acceptance and are generally used for all kinds of commercial transactions except mill buying of wheat for grinding, where characteristics other than those included in the official grades are frequently considered. Like the cotton standards, United States grades for grain, especially wheat, have received recognition abroad, and are rather generally accepted as a basis for purchasing from this country. To a greater extent than in the case of cotton grain grades are carried directly back to the farmer.

The Warehouse Act, passed in 1916, is the basis of another series of grades, which are mandatory for the purposes of the Act. Originally the provisions of the law applied only to cotton, grain, wool, and tobacco, but in 1923 it was amended to give the Secretary for Agriculture authority to place under it such other products as he might consider properly storable. Since that time a number of other products have been added to the list.

Receipts issued for goods stored in warehouses licensed under the Act are required to designate in some manner the grade of the goods and to employ for this purpose official United States grades when such have been promulgated. For commodities not already provided with official grades the Secretary is authorised to set up standards, or to designate what grades or requirements shall be followed.

Cotton and grain standards were, of course, already provided for when the Act came into force. There had long been a desire for wool standards, manifest even as early as the fall of 1914 in a request from the National Wool Growers' Association. In 1923 standards covering diameter of wool fibre were promulgated under the Act and also became effective for permissive use outside warehouse transactions. At the suggestion of manufacturers' associations, which had endorsed those standards, consultations were held with British users and in 1926 a uniform set of wool standards was agreed upon and the former United States grades were revised accordingly. Corresponding standards for wool tops were also agreed upon, uniform for the two countries, and were promulgated in 1926. Thus for wool, an important import commodity in the United States, the official grades in this country are in conformity with those in Great Britain, the chief world market.

### Tobacco Grades.

Tobacco grades also have been established under the authority of the Warehouse Act. To provide for the great variation in characteristics of tobacco the American-grown leaf is divided first into six classes—flue-cured, fire-cured, air-cured, cigar filler, cigar binder, and cigar wrapper. Within these classes types are distinguished, twenty-nine in all, for twenty of which tentative grades have been prepared, representing approximately 97 per cent. of American production. These grades are based upon quality, colour, and length of leaf, with definite standards established for each.

While not yet officially promulgated for general use, these grades have been employed successfully for more than four years in the administration of the Warehouse Act, and have been used by co-operative associations as a basis for settlement with their members. They have served for the grading of more than a billion pounds of tobacco, and already they are having a marked influence upon farmers.



### **Grading Under Inspection Service.**

The remaining grades prepared by the Department of Agriculture are permissive. Many are still tentative and a number yet in the experimental stage. Developed in connection with the inspection service, these standards find their legal basis in the annual appropriation Acts enabling the Secretary for Agriculture to "investigate and certify to shippers and other interested parties the class, quality, and/or condition of cotton, fruits, vegetables, poultry, butter, hay and other perishable farm products when offered for interstate shipment or when received at such important central markets as the secretary may designate, or at points conveniently reached therefrom."

The field of perishables is one where the services of the department have been particularly helpful, since there has been little progress in co-operative sales organisation among growers of highly perishable short-season truck crops for shipment to distant markets. Dairy products, including eggs, have been somewhat better cared for through producer activity, but even here there is a wide field of usefulness open to official grades. Among live stock producers numerous co-operative marketing agencies have been formed, but these do not appear to have made any special attempt to establish producers' grades.

### **Live Stock.**

The live stock market is abundantly illustrative both of the problems encountered in attempting to prepare a set of grades and of the conditions it is sought to remedy. The value of the live stock depends largely upon the quality of meat. In preparing an experimental set of live stock grades, it has been necessary to arrive at some determination of external characteristics which appear to give the closest indication of the quality of the dressed meat. The basic division into classes, such as steers, heifers, lambs, and so forth, and into age and weight groups is relatively easy, and these factors are important determinants of meat quality. Beyond these divisions the grades proposed are based upon three types of characteristics—conformation, finish, and muscle quality so far as it can be determined in the live animal. Difficulties of grading are further enhanced by the fact that within the basic classes and groups grades depend upon the application of descriptive terms. Moreover, each animal must be graded individually.

Proportionate to the difficulty of grading live stock is the need of the producer for some kind of uniform market standards. Because of these very difficulties of grading, trade practices have remained in a particularly unorganised state. Live animals have always been bought on inspection at the central markets and descriptive terms are subject to variations between markets and even in the same market between different times of year or different seasons. With improving rail facilities and market reports, producers are less inclined than formerly to confine their shipments to a single market, and a basis for accurate comparison of quotations in various markets is, therefore, especially desirable. Moreover, producers of live stock, particularly cattle and lambs, are frequently long distances from their markets, making the presence at the market of a disinterested grading authority especially serviceable.

Carcass meats are somewhat easier to grade since they are practically the final product. But they, too, are gauged mainly by the application of descriptive terms, and again each carcass must be graded. Standard grades have been prepared for the principal kinds of meat, but have not yet been made official under the inspection authority except in the case of carcass beef. Substantially these same grades for all meats have been used since 1917, however, by the Department of Agriculture in its market news service, and they have been the basis of grading millions of pounds of meat purchased by Federal and State authorities. Within the last few months an experiment has been begun in stamping beef carcasses with official grade marks for identification in retail cuts, in order to test consumer demand for the assurance furnished by these standards.

### **Butter and Cheese.**

Butter and cheese are far more easily graded than live stock. They are already in the state to be consumed, sampling is an adequate basis for grading and in addition to flavour and aroma certain measurable objective characteristics such as moisture content and physical condition are involved.

### **Eggs.**

Tentative grades issued for eggs depend upon standards for individual egg quality, which are based on the condition of the shell, position and size of the air cell and condition of the yolk, white and germ. On this same basis, plus average

weight, buying grades have been established for easy application by the local buyers who secure eggs direct from producers. Another set of grades has been devised for use in wholesale trading, based on the number of eggs of each grade, according to the individual standards, found per case and upon a series of minimum average weights and upon varying degrees of uniformity. Still a third set of grades, on the same principle as the wholesale grades, but with subdivisions within the grades, has been provided for use in retail and jobbing channels.

While United States egg grades are still far from finding country-wide use, the buying grades are already employed in a number of localities, and wholesale standards are applied as a basis of inspection in certain markets. Use of retail grades so far is confined largely to contract purchases by Government agencies and public institutions.

### **Fruit and Vegetables.**

Grades for these products have to do mainly with varietal uniformity and with objective characteristics and conditions, such as size, colour, firmness, freedom from blemish, decay, injury, foreign material, and so forth. The work of establishing standards in this field has been extended rapidly since 1922, when their usefulness was enhanced by a widening of the scope of Government inspection. Some of the most helpful activities and striking results have been achieved in this field.

While individually fruits and vegetables do not hold a place in the agriculture of the country at all comparable with that of such commodities as cotton, grain, live stock, and dairy products in the aggregate, they play an important part in total returns to the farmers of the country. Government grades and inspection have proved especially helpful to the farmer in handling these products because markets for them were generally more localised than for the major commodities and were frequently without much co-ordination or standardisation. Moreover, fruits and vegetables are in the main finished products when they leave the farm, passing through trade channels and into the hands of the consumer without processing of any sort. For them, therefore, standard grading is particularly effective in bringing producer and consumer into closer contact.

The Government inspection service is not only the basis for establishing standard grades for most of the commodities provided for, but it has been a very important factor in giving them utility and in popularising them. Inspection at central markets was begun by the Government as an aid to the Food Administration during the war, and was designed to cut down the waste and uncertainty prevalent in the marketing of perishables, and to reduce the economic and financial loss involved in marketing disputes. So well did it fulfil its purpose that demand for this service continued after the Food Administration closed, and after that it was provided for in the annual appropriation Acts.

Finally, in 1922, the scope of the service was broadened to include inspection at shipping points. The utility of this last step is attested by the demand for the service, a demand which the Department has so far been unable to meet fully. In 1926 a total of 165,529 cars was inspected at shipping points, one-fourth more than in the preceding year and a marked increase over the 73,000 cars inspected during the fiscal year 1923, the first year of operation. Inspections at receiving points in 1926 were only 32,531 cars, less than a single year's increase in shipping-point inspections and but a small advance over the preceding year. The whole inspection service is practically self-supporting. While an appropriation is made for it annually, fees charged to cover the cost of the service are returned to the Treasury.

### **Inspection at Shipping Points Emphasises Value of Grades and Standards.**

The shipping-point inspection service has probably done more than any other single activity of the Department of Agriculture to bring directly home to the farmer the meaning and value of standard grades. It gives him, in the first place, an immediate measure of the value of his products. It shows him the shortcomings of his output and affords the basis of a sound programme of producing for the requirements of the market. It provides the basis for financial return in proportion to the quality of the products and their utility to the market. Value of uniformity and pack is emphasised.

By shipping-point inspection the economic waste involved in shipping ungraded and low-grade products is brought home to the farmer. When he sees his wheat relieved of carrying the freight charge on weed seeds, his marketable apples of paying the freight on culls, his good eggs of paying the freight on bad ones, the question of grading at the farm becomes of more than academic interest to him. It is estimated, for example, that over 13,890 extra freight cars were required to



haul the dockage shipped from the four spring wheat States after the 1923 crop was harvested, and more than 800,000 dollars was paid for its transportation. Farmers who cleaned their wheat at the farm gained something over 5 cents per bushel in financial return.

The value of a Government inspection certificate in protecting the farmer from claims for damage incurred in transit needs no demonstration. The still further gain of relieving purchasers all along the line from the necessity of cutting down their prices to allow for uncertain quality is not so directly evident to him, but he is likely sooner or later to profit by it.

It is through the application of official grades at the shipping point that the most striking changes in methods of distribution have been brought about. Thousands of cars of fruits and vegetables are now sold f.o.b. loading point, making it easy to direct their marketing and delivery after they are on the rails, to reduce cross-hauls and avoid central-market gluts. A tendency toward decline in relative number of consignment sales is noticeable, on the other hand.

Another interesting development is the organisation of so-called f.o.b. auction companies, which deal exclusively on the basis of Government grading at the shipping point. These companies have representatives in numerous markets and conduct simultaneous auctions over leased wires. Goods are listed and bids received entirely on the basis of Government certificates. Business can be handled very expeditiously and sales are often made while the actual produce is still hundreds of miles away. The shipment can then be directed by the shortest route to its destination without necessarily passing through a central market, yet as far as the transaction is concerned it has had the benefit of an even wider market than could be found at a single receiving point.

These developments illustrate the strides that have been made through the Government's shipping-point inspection and grading service in renewing the contact of the farmer with the market. Through this service official grades, country-wide in their applicability, are carried to the farm. Through the flexibility it allows in trading and handling it makes possible the broadening of the market to a scale that can bring to the widespread production and consumption of to-day a utility comparable with that of local markets to local constituents.

Despite the very great value to the farmer of Government inspection service and of the uniform standards established for many of his products, they have obvious and unavoidable shortcomings which leave a whole field open for the farmer's own efforts. The standards and the inspection are of necessity confined largely to external characteristics. The farther they get from such measurable bases the more difficult it is to eliminate individual judgment in their application and to maintain their uniformity. They leave practically untouched the question of inherent quality of value in use.

For inherent quality the producer alone is responsible, and he alone can maintain it, in so far as it can be maintained in the face of varying weather and other conditions. In this fact lies the basis of similarity of his marketing problems with those of industrial producers, and in this fact also his opportunity for positive, maximal standards, if they are to be established, and for aggressive merchandising. As yet the possibilities in this field have scarcely been envisaged, but more and more the vital character of the problems involved is being brought home to the producer in his struggle to maintain operations at profitable capacity.

Except where concentration of ownership has occurred, the usual resort of farmers in order to provide for merchandising on a scale commensurate with the market to be reached has been organisation for co-operative marketing. Grading of produce is a natural step in the effort of such organisations to market against competition from individual producers, and much has been done among their memberships to raise standards of quality. Rather than to develop their own grades, however, the tendency is for co-operative marketing associations to adopt United States standards, where such standards have been established, because of the wide recognition accorded them in the trade. This is done sometimes even when distinctive brands are also used. Not only has this practice aided the producers' associations in developing their marketing operations, but their use of the official standards has helped to widen acceptance of these standards among trade agencies.

There are, on the other hand, some outstanding instances where co-operative associations have established their own grades as well as brands, and by means of extensive advertising have secured for them recognition not only in this country but abroad. Notable among them are organisations for marketing California citrus fruits, raisins and prunes, and apples from the Pacific North-west. In all these cases advertising has been carried directly to the consumer, as in the case of so many manufactured products. The citrus fruits are stamped with the brand of the

organisation, and prunes and raisins not being perishable are put up in retail packages for sale unbroken to the consumer. A similar experiment is being tried in distributing branded eggs but without the same type of advertising.

These developments are significant from the point of view of distributive technique, and they have done much to improve the quality of the products, but as yet grading even by such associations is largely on the basis of external characteristics similar to those found in Government standards. Whether greater refinements in standards of quality are possible for many farm products and can be secured by growers' organisations, and whether the market will support them if they can is still to be seen.

Even along the line of present attainments the movement toward standardising grades of agricultural products, whether issuing in governmental activity or producer control, is bound to have a great influence upon future developments in the agriculture of the country. That a more effective mechanism of distribution in line with the possibilities of modern transportation and communication will help to relieve the present difficulties of the farmer there can be little doubt.

### LIVE STOCK IN QUEENSLAND.

The Registrar-General, Mr. George Porter, has kindly supplied the following statement showing the number of Live Stock in the several Pastoral Districts and in the State on the 1st January, 1927, together with similar details for last year:—

District.	Number of Horses.		Number of Cattle.		Number of Sheep.		Number of Pigs.	
	1926.	1927.	1926.	1927.	1926.	1927.	1926.	1927.
Burke ..	53,690	42,738	825,822	685,267	2,928,780	1,978,074	516	414
Burnett ..	39,283	38,185	467,036	440,562	5,263	7,487	32,933	30,808
Cook ..	49,072	44,252	527,624	520,708	270	12,580	7,673	8,323
Darling Downs	72,569	69,158	468,389	414,433	1,862,217	2,045,745	42,180	35,664
Gregory North	24,711	19,119	297,335	212,735	1,964,021	1,086,545	36	35
Gregory South	10,215	10,429	176,275	135,915	286,189	344,859	1	1
Leichhardt	48,058	40,384	761,676	568,449	979,070	840,487	1,915	1,513
Maranoa ..	29,254	28,607	273,224	235,658	2,785,128	3,366,810	1,553	1,485
Mitchell ..	41,258	33,318	196,115	114,015	6,696,458	4,135,681	498	460
Moreton ..	65,461	62,730	502,658	476,828	25,257	22,022	75,731	69,895
North Kennedy	70,456	62,899	503,296	454,412	4,528	22,214	5,673	5,160
Port Curtis	39,093	33,486	449,203	383,711	27,462	28,040	8,523	7,877
South Kennedy	37,985	33,879	432,297	328,545	154,642	165,182	1,281	1,709
Warrego ..	24,255	21,684	236,587	191,168	2,938,281	2,799,535	600	510
Wide Bay..	33,012	30,754	319,108	302,439	5,757	5,511	20,485	19,808
			Horses.	Cattle.	Sheep.		Pigs.	
Total for year 1926 ..			571,622	5,464,845	16,860,772		183,662	
Total for year 1925 ..			638,372	6,436,645	20,663,323		199,598	
Decrease .. ..			66,750	971,800	3,802,551		15,936	



## FARM TRACTORS AND THEIR MANAGEMENT.

By E. T. BROWN.\*

Recently I was an interested listener to a discussion between two farmers. One was running his farm as a motorised farm and the other relied upon horses for his power. I am not going to recount the discussion in full, but a summary of the statements of both parties may prove instructive. Let the last-mentioned farmer speak first. He claimed that horses were preferable for the following reasons:—When horses are employed less artificial manure has to be purchased and these manures are expensive; a tractor depreciates in value from the time it is bought, but a horse grows into money; ploughing by tractor cannot be done more cheaply than by horse power; more labour may be required for horse work, but skilled labour—at a high price—must be used for tractor work; horses work practically every day of the year, but tractors do not; if a horse falls sick it can be replaced, but if a tractor goes wrong the whole work of the farm is delayed; the work of looking after a tractor is greater than the daily attention needed by horses; for light work or ploughing on hilly land horses give better results; and, lastly, it is bad policy for a farmer to sink too much money in machinery.

### The Tractor Owner Speaks.

The owner of the motorised farm was most emphatic, and he stated that his arguments were unanswerable. They were as follows:—The tractor saves the farmer time, worry, and money—Time, since the tractor accomplishes the work more expeditiously; it saves him worry, since his work is not controlled to the same extent by the weather; it saves him money in all directions. The tractor allows a farmer to overtake an excess of work at the rush season of the year when it is extremely difficult to obtain additional labour; the quality of the work done is better, especially as regards ploughing; less man power is required on the motorised farm, since one man with a tractor can raise three or four times as much in the way of crops as a man with a team; a tractor releases a large amount of food that can then be used for feeding to stock with a view to meat production. It releases about five acres of cultivated land for every horse that it replaces.

### The Non-Tirable Tractor.

A tractor will work for very long hours so long as it is supplied with the necessary fuel, oil, and water. It does not grow tired, and, moreover, there is no need to rest it during the day; it can be employed most efficiently for all kinds of belt work, whether the stationary machines to be driven are large or small; road haulage can be performed more quickly and much more cheaply with a tractor than with horses, since the power of a tractor is sufficient to haul a heavy load at a decent speed over average roads; a tractor costs nothing for upkeep when it is not being used, whereas horses have to be fed whether they are working or not; a tractor does not require feeding, grooming, nor does the stable have to be cleaned out daily; and, lastly, the cost of working a tractor is less than when horses are employed.

### Wagon Hitches.

Ordinary farm wagons can be employed as trailers for the tractor to draw, but it is essential that the hitches used should be suitable for the purpose. A considerable portion of the power generated by the engine can be wasted if the hitch be improperly set. As a general rule, it is found that the ordinary farm wagon is too high, when the shafts have been removed, to hitch directly on to the draw-bar of the tractor. If the connection be made direct, when this difference in height exists, two results follow: The front of the wagon is pulled downwards—the wagon is always higher than the tractor—and the rear of the tractor may be eased off the ground. This will add very considerably to the weight of the trailer and its load, and it will reduce the adhesion of the rear wheels of the tractor, thus causing great loss of power. The solution of the difficulty is, of course, to bring the level of the two draw-bars equal. Place the connection on the wagon as low as possible, and by means of a suitably made and designed bracket, supported by stays, attached to the draw-bar of the tractor, the two can be brought into line. The bracket must be made specially for the individual tractor, since there is no universal design which will answer in all cases. When running on the road never exceed four to five miles an hour, and do not forget that the outfit must be licensed and an annual tax paid.

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\* In the "Farmer and Settler."

**THE LATE JAMES A. ROBERTSON.****AN APPRECIATION.**

The cattle and pig breeding industries of Australia, and especially of New South Wales, have suffered a severe loss by the death of Mr. James A. Robertson, M.R.C.V.S., Herd Master to the Department of Agriculture, New South Wales, which occurred suddenly at his home at Lindfield on the North Shore line, Sydney, on Monday, 26th September.

Mr. Robertson attended the Melbourne Show on departmental and Herd-book business, spending an exceptionally busy week, returning to Sydney apparently in normal health on the Friday before his death. On Sunday he had a seizure, from which he never rallied.

As a cattle breeder Mr. Robertson had attained a foremost position in Australia. He had a sound and deep knowledge of the various breeds and of the principles of breeding, and this he applied with the intuition of the master breeder. When he entered the service of the New South Wales Department of Agriculture, thirteen years ago, the State dairy herds were at a low ebb, but by careful selection and judicious but not lavish introduction of new blood they have been developed to a high plane on both standard and production lines.

Mr. Robertson paid a great deal of attention also to the pig studs at the several Government institutions, and his influence for good in suggesting and carrying through improvements in these studs resulted in a very considerable improvement in type and quality of the animals bred and exhibited.

Mr. Robertson was born in 1884, and his early training was acquired on the Coolangatta Estate, on the far-famed South Coast of New South Wales. At the age of twelve years he was conducting milk and cream tests for the Jersey Milk Condensory on the estate. He spent some time also at Logan's Aston Estate, in the Bombala-Delegate districts of New South Wales, and later started out on his own in the dairying business. He went to Edinburgh in 1905, and four years later graduated with honours as a veterinary surgeon at the Royal Veterinary College, and was offered a post on the college staff. This, however, he did not accept, but returned to Australia and began practice as a veterinary surgeon at Lismore, New South Wales, and four years later entered upon the official position as herd master, which he has since occupied. Also for twelve years he held the position of Examiner in Animal Husbandry and Meat Inspection at the Technical College, Sydney, and in dairy farming and live stock at the Hawkesbury Agricultural College, Richmond.

Part of Mr. Robertson's early apprenticeship was served under Messrs. John Pottie and Sons, well-known veterinary surgeons of Sydney.

His place will be a difficult one to fill both in departmental and private life. He had a large circle of friends, all of whom will join in extending sincere sympathy to his bereaved widow and family.

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**WHEAT CROP PROSPECTS.**

On his return from a recent tour of duty the Director of Agriculture, Mr. H. C. Quodling, informed the Press that, owing to the extent of country embraced in the competition, it will entail a good deal of travelling before it is finalised; since leaving Brisbane during the first week of this month over 1,000 miles have been traversed, and this has permitted of a useful survey of much of this year's wheat crop. Leaving the Maranoa district out of the question, where, unfortunately, an aggregate of only a few thousand bags will be harvested this year; also the Inglewood district, in which late-maturing crops will be the only ones to show any pronounced response to the recent rains, as the earlier-sown fields made an attenuated growth, one cannot be otherwise than impressed with the extraordinary improvement wrought by the October rains, and manifest in the wheatfields over practically the whole Darling Downs. If nothing untoward happens (and wheat is never safe until it is sound and dry in the bag) this year's yield should reach the three million-bushel mark. In some districts it is doubtful whether more promising crops have even been grown, and this applies more particularly to those on the deep, rich black and brown soils common to the Downs. The better-grown and heavier-yielding crops are invariably to be found where a system of summer fallowing has been observed. In January, the rainfall on the Darling Downs ranged generally from 8 to 11 inches, and in the first four months of the year the aggregate fall varied between 15 and 21 inches. Where the surface of the soil had been cultivated immediately after last year's harvest and brought into a fit condition to absorb moisture, and the surface subsequently kept in a state of cultivation, reserve supplies of moisture were in this way retained in the subsoil. Luckily, good rains fell in June—about three inches—



and, although July, August, and September were dry enough to cause much anxiety to growers, the October rains saved the situation, and a bountiful harvest is in prospect. "The wheatgrower has certainly had his share of disappointment," said Mr. Quodling, "but there's no question to my mind of his succeeding where early and systematic cultivation is practised. The deep soils of the Downs, particularly on the plains, do not require deep cultivation; as a matter of fact, for wheat, 3 to 4 inches are all-sufficient; but for success, the principles underlying cultivation require to be carefully observed. Better and more suitable varieties are now available to growers, and officers in the Agricultural Branch of the Department of Agriculture and Stock have accomplished very much in this direction."

"Those who are in a position to rapidly cultivate extensive areas of land by means of tractors and large horse teams, and so save the moisture before it is disseminated, will undoubtedly do much towards the improvement of Queensland as a wheat-growing State; which, in addition to sheep-raising in the agricultural districts, is also suitable for a number of other forms of primary production not generally open to settlers in other States."

### Progress of Wheatgrowing.

When asked for an opinion whether wheatgrowing was showing material progress in any locality, Mr. Quodling stated that in a number of localities a distinct advance was to be observed in the area being cropped with wheat; possibly the more pronounced improvement was to be seen on the black soil plain country south-west from Evanslea, on the Cecil Plains line. There are a number of large wheatgrowers in the district, many of whom are successfully combining wheat and sheep. Their crops this year are extraordinarily promising, and yields of from 8 to 10 bags per acre will prevail. The largest individual area cropped in this locality is 2,000 acres by Messrs. Zeisemer Bros., who have very fine crops, included in which is a 640-acre paddock of Gluyas wheat, also extensive areas of other varieties. The land cropped is a fair sample of several hundred thousand acres of similar land, much of which could, and will, no doubt, be turned to similar account in the future.

## WHEAT CROP COMPETITION.

### SEASONAL PROSPECTS.

Wet weather interfered with the work of judging crops entered in the wheat crop competition promoted by the combined Agricultural Societies of Queensland.

The controlling Divisional Societies originally comprised the Eastern Downs H. and A. Association, Warwick; the Royal Agricultural Society of Queensland, at Toowoomba; and the Roma and Wallumbilla Agricultural Societies, certain boundaries being fixed for the purpose of the competition, for three districts known as:—

- (1) Southern and East Central;
- (2) North Central;
- (3) Western.

No. 1 embraces the railway system of Wallangarra, Killarney, Maryvale, Goomburra, King's Creek, and Dirranbandi;

No. 2, King's Creek, Milmerran, Cecil Plains, Tara, Chinchilla, Jandowae, Bell, Cooyar, Haden, Crow's Nest, and Toowoomba; and

No. 3, Chinchilla, Cunnamulla, Injune, Juandah.

Owing to the severity of the season in the Maranoa and contiguous districts, no entries were received from growers in those areas which came under the purview of the Roma and Wallumbilla Societies; however, the other two Agricultural Societies at Toowoomba and Warwick have taken an active part in promoting the competition. Substantial prizes are being offered, and the Royal National Association of Brisbane has supplemented these by a Grand Championship Cup and other trophies.

Ten of the twenty odd crops entered through the Royal Agricultural Society of Toowoomba have already been judged.

The judging is carried out under a fixed scale of points—

- |                                 |         |                          |
|---------------------------------|---------|--------------------------|
| (1) Apparent yield              | .. .. . | 1 point for every bushel |
| (2) Trueness to type and purity | .. .. . | 20 points.               |
| (3) Freedom from disease        | .. .. . | 30 points.               |
| (4) Evenness of crop            | .. .. . | 10 points.               |
| (5) Cleanliness                 | .. .. . | 20 points.               |

The date for the receipt of entries was extended by the Eastern Downs H. and A. Association, to 29th October.

## SELF-FEEDERS FOR PIGS.

### ONE AND TWO WAY SELF-FEEDERS.

F. BOSTOCK, Assistant Instructor in Pig Raising.

A "self-feeder" is simply a device by means of which a supply of grain or other feeds may be kept constantly available to the pigs, in order that they may satisfy the cravings of their appetites.

Pigs in the wild state were naturally self-fed animals, living upon such foods as would satisfy their appetites. The marked success of the self-feeding system of pig raising in America is largely due to the fact that the pigs may eat an abundance of such feeds as will nourish them to the best advantage.

Pig raising as an industry is generally regarded as a profitable one, particularly when it is carried on in conjunction with some other branch of agriculture, such as dairying and mixed farming.

It is intended, in this article, to indicate how, by the introduction of the self-feeder as a labour-saving appliance, the actual amount of labour necessary for carrying on the business might be reduced.

Self-feeders, as illustrated in Figs. 1 and 2, are practicable when grain is being fed, and for this purpose are intended for use more especially during the growing and fattening stages in the life of the bacon pigs, and are not specially recommended for use in feeding breeding sows, though even for this purpose the self-feeder may be used, but if so used the mixture of foods should be more nitrogenous (flesh forming) than is usually given to baconers. This is because breeding sows in general only require a limited allowance of grain.

The two types of self-feeders as shown in the plans (Figs. 1 and 2) should be built on skids or runners to prevent pigs rooting at the floors and to facilitate moving. If strongly constructed this method of transport will be found to be much easier and quicker than loading the feeder into a wagon or on to a sledge.

Self-feeders should be designed primarily to keep an available supply of grain constantly before the pigs, and at the same time protect its contents against waste, due to wind and rain.

It consists of a hopper to hold the food and a trough below into which the grain is allowed to flow, the sliding and hinged flaps regulate the amount of grain permitted to flow into the trough as the pigs eat it.

The hopper is made sufficiently large to hold several days' supply of feed, and the inside walls should be as smooth as possible in order not to prevent the flow of grain into the trough.

When it is desired to feed two or more foods separately in the same self-feeder, a partition may easily be placed in the hopper at any distance from either end.

The self-feeder should be placed on a wooden or concrete platform if possible (Fig. 3), and if well constructed with first-grade timber, and given a coat of paint about once every twelve months, should give service for quite a number of years.

By means of the self-feeder the average farmer should obtain as good results as the hand-feeder with much saving of time and labour.

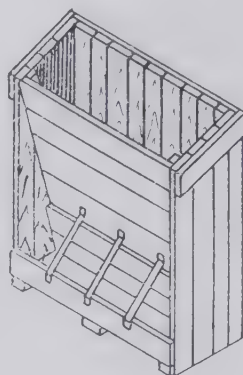
According to American experiments, there is very little doubt which method is the more economical, and as shown by the results of a number of experiments the self-feeder system is advantageous in every respect. Its use results in larger daily gains in live weight, bringing the pigs to marketable weights at an earlier date, and although the feed is consumed more rapidly there is an actual saving in the amount of feed required to produce the 100 lb. of gain. This is a fact of extreme importance and is well worth consideration.

Last, but not least, one of the advantages to be gained is the saving of time and labour. At the same time, the farmer must not neglect the self-feeder; because he has filled the hopper with grain he cannot afford to forget about it. The old adage, "The eye of the master fattens his cattle," holds good when applied to the self-feeding of pigs. There are a number of things which may happen to the self-feeder if left without attention. For instance, the feed may block in the hopper, thus leaving the pigs with a dead self-feeder, or the feed may become soiled in the trough, making it unpalatable to the pigs.

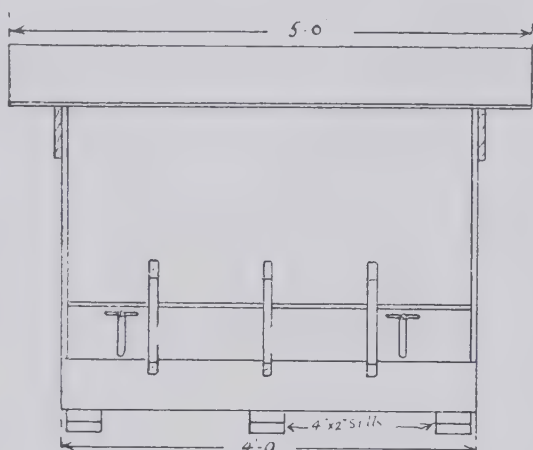
In cases where a mixture of feeds is being used the farmer should furnish the proper proportions of the different feed constituents. He should feed a larger percentage of protein (flesh-forming) to the young pigs which are growing than to the older ones. Just because pigs are self-fed a mixture of feeds does not mean that they are receiving a balanced ration.



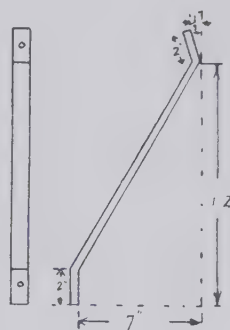
# ONE WAY SELF FEEDER FOR PIGS



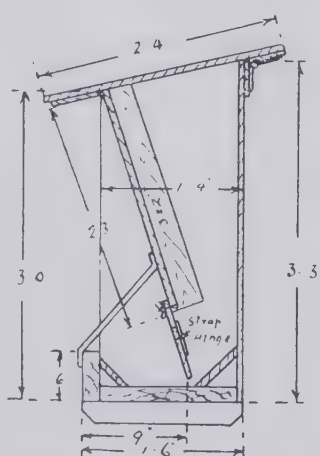
Perspective with Roof Removed



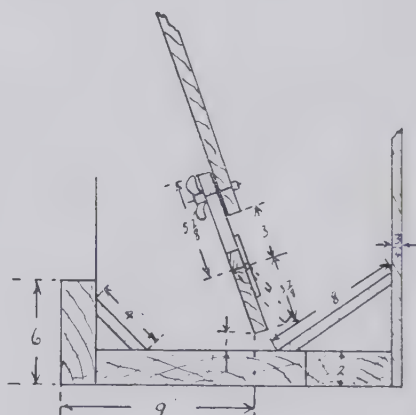
Front Elevation



———— Detail of Iron Strap ————



Section



— Detail of Slide and Hinged Floor —

— Drawn by J.B.

PLATE 128 (Fig. 1).







PLATE 130 (Fig. 3).—SELF-FEEDERS IN USE ON AN AMERICAN FARM.

Note the Wooden Platform on which the Feeders are placed.



PLATE 131 (Fig. 4).—SELF-FEEDING SYSTEM IN OPERATION ON A LARGE AMERICAN PIG FARM.

A self-feeder is by no means a substitute for a knowledge of feeding. The self-feeder may be adapted to the feeding of any kind of grain, although shelled grain and ground foods are most commonly used. It may be used to feed maize on the cob, but in this case the feeder would be required to be of a larger size than shown in Figs 1 and 2 in order to hold sufficient grain to feed a number of pigs for several days without refilling.

Maizemeal or barley would require a smaller opening to prevent too rapid a flow of grain than would, say, whole maize. It will be noted in the plans that the sliding and hinged flaps have been fitted with thumb screws so as it may be adjusted to suit the type of grain being fed.

Farmers feeding with dairy by-products will have no need to feed concentrates such as protein meal or meat meal, for skim milk is very suitable to balance such grains as maize or barley. Of course, the dairy by-products should not be self-fed, for they would soon spoil if more feed is fed than the pigs will clean up at one feeding. Self-feed the grain and hand feed twice daily enough of the skim milk to balance the ration.



PLATE 132 (Fig. 5).—SHOWING METHOD OF TRANSPORTATION.

According to results of American experiments when feeding pigs without pasture, the following was found to be the average proportions in which to feed milk and grain, and should serve as a guide:—

For pigs just after weaning 4 lb. to 6 lb. of skim milk to each 1 lb. of maize will be found to be sufficient to make the maximum gains. As the pigs grow older the proportion of skim milk may be decreased. Pigs weighing 50 lb. to 100 lb., 3 lb. of skim milk to every 1 lb. of maize, and pigs at 100 lb. to 150 lb. would require from 2 lb. to 2½ lb. of skim milk to every 1 lb. of maize consumed. Pigs on pasture such as lucerne, rape, barley, &c., would need only about half as much skim milk as indicated above. Considerably more milk than previously stated may be fed with good results when a surplus is on hand. Pigs cannot be expected to do much grazing on a crop that is any distance away from the self-feeders. It is in such cases where grazing is intended to form part of the ration that the skids or runners will be found to be an advantage in taking the self-feeder to the crop it is proposed to graze off.

Copies of the plans illustrated in this article may be obtained on application to the Under Secretary, Department of Agriculture and Stock, Brisbane, Queensland.



ONE-WAY SELF-FEEDER FOR PIGS.—MATERIAL REQUIRED.

Members.	Number.	Length.	Size.	Material.
Skids .. .. .	Three ..	1 ft. 6 in.	4 in. x 2 in. ..	Hardwood
Trough .. .. .	One ..	4 ft. ..	6 in. x 2 in. ..	Pine
Trough .. .. .	One ..	3 ft. 10 $\frac{1}{2}$ in.	12 in. x 2 in. ..	Pine
Trough .. .. .	One ..	3 ft. 10 $\frac{1}{2}$ in.	4 in. x 2 in. ..	Pine
Trough .. .. .	One ..	3 ft. 10 $\frac{1}{2}$ in.	8 in. x $\frac{3}{4}$ in. ..	Pine
Trough .. .. .	One ..	3 ft. 10 $\frac{1}{2}$ in.	4 in. x $\frac{3}{4}$ in. ..	Pine
Front Panels .. ..	Five ..	3 ft. 10 $\frac{1}{2}$ in.	6 in. x $\frac{3}{4}$ in., T. & G.	Pine
Front Panels .. ..	Two ..	2 ft. 3 in.	3 in. x 2 in. ..	Pine
Sliding and Hinged Flaps	Two ..	3 ft. 10 $\frac{1}{2}$ in.	4 in. x $\frac{3}{4}$ in. ..	Pine
Ends and Back .. ..	Twenty-four	3 ft. 3 in.	6 in. x $\frac{3}{4}$ in., T. & G.	Pine
Ends and Back .. ..	One ..	7 ft. ..	6 in. x $\frac{3}{4}$ in. ..	Pine
Top .. .. .	Ten ..	2 ft. 4 in.	6 in. x $\frac{3}{4}$ in., T. & G.	Pine
Top .. .. .	Two ..	5 ft. ..	6 in. x $\frac{3}{4}$ in. ..	Pine

Hardware.

Three 1-inch by  $\frac{1}{4}$ -inch iron straps.  
Six 3-inch strap hinges.  
Two 3-inch by  $\frac{1}{2}$ -inch bolts with thumb nuts.  
Nails, &c.

TWO-WAY SELF-FEEDER FOR PIGS.—MATERIAL REQUIRED.

Members.	Number.	Length.	Size.	Material.
Skids .. .. .	Three ..	3 ft. ..	4 in. x 2 in. ..	Hardwood
Trough .. .. .	Two ..	4 ft. ..	6 in. x 2 in. ..	Pine
Trough .. .. .	Two ..	3 ft. 10 $\frac{1}{2}$ in.	12 in. x 2 in. ..	Pine
Trough .. .. .	Two ..	3 ft. 10 $\frac{1}{2}$ in.	8 in. x $\frac{3}{4}$ in. ..	Pine
Trough .. .. .	Two ..	3 ft. 10 $\frac{1}{2}$ in.	4 in. x $\frac{3}{4}$ in. ..	Pine
Panels .. .. .	Ten ..	3 ft. 10 $\frac{1}{2}$ in.	6 in. x $\frac{3}{4}$ in., T. & G.	Pine
Panels .. .. .	Four ..	2 ft. 3 in.	3 in. x 2 in. ..	Pine
Sliding and Hinged Flap	Four ..	3 ft. 10 $\frac{1}{2}$ in.	4 in. x $\frac{3}{4}$ in. ..	Pine
Ends .. .. .	Twelve ..	4 ft. 2 in.	6 in. x $\frac{3}{4}$ in., T. & G.	Pine
Frame of Roof .. ..	One ..	4 ft. ..	6 in. x 2 in. ..	Pine
Frame of Roof .. ..	Four ..	1 ft 9 in.	3 in. x 2 in. ..	Pine
Frame of Roof .. ..	Two ..	2 ft. ..	4 in. x 1 in. ..	Pine
Roof .. .. .	Twenty ..	2 ft. 4 in.	6 in. x $\frac{3}{4}$ in., T. & G.	Pine
Roof .. .. .	Four ..	5 ft. ..	6 in. x $\frac{3}{4}$ in. ..	Pine

Hardware.

Six 1-inch by  $\frac{1}{4}$ -inch iron straps.  
Eight 3-inch strap hinges.  
Two 5-inch strap hinges.  
Four 3-inch by  $\frac{1}{2}$ -inch bolts with thumb nuts.  
Nails, &c.

THE JOURNAL IN HOLLAND.

Thus the Director of the Ver Bureau Voor Handel'sin'ichtingen (Foreign Relations Office), Amsterdam: “ . . . In view of the many inquiries which reach us for information about Australia . . . . we shall appreciate having your monthly (the ‘Queensland Agricultural Journal’) in our library. . . . .”

## PARALYSIS OF THE HINDQUARTERS IN PIGS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

*In the course of recent tours both in the Northern and Central Divisions as well as in Southern Queensland, and also during a lengthy experience in New South Wales, Mr. Shelton has noticed a number of pigs suffering from the trouble most frequently spoken of as Paralysis of the Hindquarters. This disease is also, on occasion, erroneously referred to as Staggers and Rickets, while other terms used to indicate a similar condition are Down in the Back, Kidney Worms, or Paralysis.*

*As it is evident from a perusal of the many references to the actual cause of this somewhat unfortunate occurrence in pigs that it is largely a "deficiency" disease, one almost entirely due to an insufficient supply of mineral matters (bone-forming materials) in the food and to lack of green food, &c., it is obviously a subject that must be handled more along the lines of prevention than actual treatment; one coming within the ambit of the "instructor" more than the "inspector," and one that must be remedied more by an all-round improvement in the system of breeding, feeding, and handling than by the administration of medicine. Mr. Shelton's notes on the subject are therefore of unusual interest.—Ed.*

Numerous inquiries reach the Department annually as to the cause and treatment of this all too common and very peculiar disease, if such it might be called. The subject has been dealt with previously in this Journal as well as in pamphlet form, but as both leaflet and pamphlet are now out of print, and as the trouble is of such an important nature, it warrants revision and repetition—this especially as further evidence of a very helpful nature has lately been received through official channels and from correspondents overseas.

A great deal has been written regarding "Paralysis of the Hindquarters in Pigs" and much research work has been carried out, principally with a view to ascertaining the exact nature of the conditions under which the disease occurs, and in studying the subject it is of interest to know just what other authorities are doing, and to determine whether or not their findings are applicable to our conditions in Queensland.

The disease is very largely one due to a deficiency of mineral matters in the food and to malnutrition, hence the writer's objective is to suggest how by improved methods of feeding and caring for pigs these abnormal conditions can be overcome. The Veterinary Officers of this Department should be consulted on all matters relating to medicinal treatment; their advice is also always available in case of any outbreak of disease no matter whether it be of a minor or of a more serious nature.

Paralysis of the hindquarters in pigs is, unfortunately, a trouble not confined to young pigs only, nor is it localised in Queensland. It appears to be a source of considerable trouble wherever pigs are kept the world over, though where the conditions under which pigs are kept are favourable to early maturity and to the healthy and rapid growth of all breeding stock, the disease has been kept in check and has caused but little trouble.

In referring to the occurrence of paralysis in pigs in this State and elsewhere, the Chief Inspector of Stock, Major A. H. Cory, M.R.C.V.S., states that—

"The subject of paralysis in pigs has been given considerable attention for many years past.

"A small leaflet was issued some years ago to farmers dealing with what was then considered three principal causes of the complaint, but in recent years it has been ascertained that the paralysis, in many cases, is due to the lack of a vitamine known as Fat Soluble A, which is essential to the growth of animals, a deficiency leading to rickets.

"This vitamine is found in certain herbage, milk, cream, butter, eggs (yolk), beef fat, and cod liver oil. Latterly cod liver oil has been recommended to make up for the vitamine referred to, with, as far as can be ascertained, marked benefit.



"There is little to report regarding the incidence of the disease, as it occurs in any part of Queensland where pigs are improperly fed and not given the necessary attention. The same conditions exist all over the civilised world. It is mostly young growing pigs which are affected, and generally those in good condition.

"Apart from the paralysis, the pigs usually feed well and appear normal, the pathological changes taking place being apparently microscopical."

Professor L. A. Maynard, of the New York State College of Agriculture, Department of Animal Husbandry, has written on the following lines as a result of his experience:—

"This problem has been under investigation here for several years. On the basis of our studies, we believe the trouble is the result of improper mineral nutrition which prohibits a normal development of bone. This is due to a lack of calcium in most of our rations. We have shown that where paralysis occurs, the long bones are very deficient in calcium and phosphorus, and marked histological changes have occurred. These changes have been observed on a diet low in calcium. However, a lack of calcium is not the only factor involved, because the question of assimilation also comes in.

"Certain feeds are rich in the factor aiding mineral assimilation, and certain others are not. A ration which contains a certain amount of chopped alfalfa (green lucerne or lucerne chaff) is very useful for preventing paralysis, because it supplies the needed calcium and phosphorus and the factor aiding assimilation as well. We have shown, however, that there is a very beneficial effect from the adding of ground limestone and bone meal to rations which are now causing the trouble."

In a communication from Professor R. Adams-Dutcher, Head of the Department of Chemical Agriculture at the State College and Experiment Station, Pennsylvania, U.S.A., the following remarks appear:—

"I have the feeling from the knowledge that I have been able to obtain by reading, and in experimenting, that the diet is a very important factor in preventing paralysis in pigs, and probably calcium and phosphorus accompanied by proper vitamine-carrying foods are the most important dietary factors. Any number of animals have been relieved of the paralytic symptoms by feeding bone meals or other mineral mixtures carrying calcium and phosphorus; mixtures which carry calcium carbonate have also been effective. Veterinarians in New York have had fairly good success with wood ashes, but it is my recommendation that lime or bone meal be made available in those districts where hog paralysis is causing trouble. If lucerne or some other leafy green stuff or hay is available, this would also improve the situation, helping the animals to utilise this mineral matter to the best degree of efficiency."

The following extracts have been taken at random from mimeographs supplied by Professor John M. Evvard, as a result of extensive experiment along the lines of feeding mineral mixtures, both simple and complex, to pigs not only with the idea of preventing paralysis, but of stimulating growth and enhancing the returns.

### Comment.

(1) The feeding of minerals in whatever form allowed was quite advantageous in that the average daily gains were substantially increased, the length of the feeding period economically shortened, the feed required per 100 lb. gain considerably reduced, and the profits per pig enhanced.

(2) In feeding experiments the appetites of pigs for minerals is shown to be of considerable reliability, inasmuch as they clearly excelled check groups receiving no minerals.

(3) Although there appears to be some advantage gained from the feeding of a mineral mixture carrying more than the single emphasised ingredients, such as common salt, calcium carbonate, bone ingredients, and potassium iodide, yet just how far one can afford to go in the adding of other ingredients in practice is a matter for individual estimation and determination. Our experience has certainly indicated that some of the main ingredients necessary in the mineral mixtures are those that carry sodium and chlorine (common salt), calcium (lime, limestone, and bone materials), phosphorus (bone materials, rock, and other phosphates), and iodine (potassium or sodium iodide). The further addition of suitable combinations of such ingredients as common sulphur, a little charcoal, some Glauber's salts, as well as some other ingredients in small percentages or quantities has, on the whole, shown some benefits in our experimental work.

(4) It appears as if the farmer in his feeding of sulphur, charcoal, and other often-questioned materials has not gone entirely wrong, and like his well-founded belief in yellow corn (as against white corn), we should be sure of our grounds before declaring them or any of them non-beneficial.

(5) Our other work with minerals has shown the dollar and cents practicability of adding a good mixture of mineral ingredients to many ordinary pig rations.

(6) Our general recommendation is to provide a suitable mineral mixture for all classes and grades of pigs—the growing pigs, the breeding sow, the suckling pigs, the boars and all—and it is our suggestion that the mineral mixture be self-fed in an easily accessible place, well protected, and under shelter if possible.

(7) A good mineral mixture may be made up for practical everyday feeding as follows:—

Common salt, 20 per cent.; finely ground raw bone meal, or steamed bone meal, or spent bone black, or rock phosphate, or acid phosphate, 40 per cent.; finely ground high calcium limestone, or wood ashes, or finely ground oyster shell, or lime thoroughly air slacked, 40 per cent. Total, 100 per cent.

If sulphur is desired, add approximately 10 lb. to the 100 lb. To every 100 lb. of the above minerals, add from  $\frac{1}{2}$  to 1 oz. of potassium iodide, mixing all ingredients thoroughly.

The following remarks upon this disease form the conclusions arrived at by Dr. J. W. Connaway, a prominent American Veterinarian, who has been associated with many of the experiments relating to this particular trouble:—

Paralysis of the hindquarters in pigs may result from one of several causes, and the treatment will vary to some extent, according to the cause of the paralysis. The causes are—(1) Injuries; (2) impaction of the lower bowels; (3) kidney worms; (4) heavy suckling; and (5) lumbago or rheumatism. Each of these causes and the preventive and curative measures are discussed in order as follows:—

### **Paralysis from Injuries.**

If the pig has been running in the same yard with horses, mules, or cattle, it may have been kicked, pawed, horned, or trodden upon, and sustained an injury to the spine, legs, or muscles of the back or hips.

*Treatment.*—Make a thorough examination of these parts. Sometimes an injury is deep-seated and can be detected only by firm pressure and other manipulations of the paralysed parts which produce evidence of pain, fractures of bones, or rupture of tendons and muscular tissues; or the pressure of deep-seated abscesses. If the paralysis is due to an injury, the best treatment is absolute rest. Put the patient under shelter in a comfortable pen, where it can be bedded and kept quiet. Feed a light laxative diet and keep the pen and bedding clean. After a time, a stimulating liniment rubbed over the injured parts may hasten recovery. A mixture of equal parts of turpentine, ammonia, and cotton-seed oil makes a very good liniment. An abscess should be opened and be given proper antiseptic treatment.

### **Paralysis from Impaction of the Bowels.**

Paralysis of the hindquarters may result from an impaction of the lower bowels with hard masses of dung, causing excessive pressure upon the nerves and blood vessels in the pelvis or hip region. If the paralysed pig seems to be badly constipated, use rectal injections of warm water to soften and remove the hard lumps of dung. Add a couple of tablespoonsful of Glauber's salts to slops (food) and feed twice daily until the bowels are loose. Impaction is most frequently due to improper feeding, and to lack of tone of the bowels. A properly balanced ration with an adequate supply of water will prevent impaction of the bowels. In cold weather, pigs frequently do not have a proper supply of water. If the water is icy cold, pigs do not drink a sufficient quantity and are liable to become constipated. Some provision should be made for warming the water to take off the chill. A warm slop once a day will be helpful in keeping the bowels of the brood sow in good condition.

The following tonic will also be found useful:—Equal parts of pulverised copperas, Glauber's salts, Sal. soda, common salt, and a double portion of powdered charcoal, which should be thoroughly mixed and put in a covered trough (self-feeder), where all the pigs can have free access to it.

### **Paralysis from Kidney Worms.**

The so-called kidney (or lard) worms "*Stephanurus dentatus*" (also called "*Sclerostoma pinguicola*") may cause paralysis of the hindquarters if these worms are present in large numbers in the sublumbar or loin region. These worms, in



the embryo stage, migrate into the fatty tissues around the kidneys, and sometimes into the kidneys and other organs, as the liver and pancreas. They produce inflammation, and at times abscesses, in the tissues where they lodge. As they are found in largest numbers in the kidney fat and loin region where the nerves are given off from the spinal cord to the hindquarters, the functions of the nerves of this region are more likely to be affected by these parasites and their toxic products.

*Treatment.*—A brisk rubbing or massage of the loin muscles, with an application of the liniment already mentioned to stimulate the nerves and increase the blood circulation of the affected region will be helpful. Turpentine should also be given internally; this will destroy many embryo worms in the intestines. As turpentine is very diffusible, it is believed to be useful in destroying these parasites in the tissues around the kidneys. To a 200-lb. pig give a tablespoonful of turpentine in half a pint of oil (cotton-seed or raw linseed); or warm milk may be substituted for oil. Shake well before using. Use a small-necked bottle, drenching horn, drenching bit, or old leather shoe with a small hole cut out in the point, and give the drench slowly, or smaller doses may be added to the slop (food). The following worm remedy is also useful:—Santonin 6 grains, calomel 4 grains; this quantity to a bacon pig 100 lb. live weight or twice the amount to a pig weighing 200 lb. or more live weight.

In every case, the bowels should be completely emptied before the medicine is given. The Santonin (or Areca Nut may be used in similar quantities) and calomel should be mixed thoroughly with a small quantity of dry meal or shorts (pollard), which may then be moistened and fed alone, or the meal and medicine may be stirred into the feed or slop. Repeat the treatment in a few days.

As a preventive, use freshly slacked lime liberally over the pig yards to destroy worm embryos on the ground over which the pigs feed. Give the pig yards a thorough liming and clean up several times in the year.

### **Paralysis from Heavy Suckling.**

Brood sows that do not have a proper ration, or that are not able to utilise it effectively, sometimes go down in the hindquarters from suckling a big litter of rapidly-growing pigs. The rapid growth of the pigs require considerable protein for muscle building and considerable bone-making material. All this must be supplied through the milk of the mother, and if the sow is not given the correct ration, her own muscles and bone tissues are depleted to supply proper elements for the growth of her pigs and the weakened condition mentioned results. This can usually be prevented by giving a food rich in protein and bone-making materials along with a corn ration. Protein supplements, such as "tankage" (meat or blood and bone meal), and linseed meal, should be provided. Protein may also be supplied by leguminous crops—clover, alfalfa (lucerne), cowpeas, and soy beans. Brood sows that have access to a feeding rack that is kept full of "pea green" lucerne or other legumes will have no trouble in supplying their pigs with both muscle and bone-forming materials, and will not be in much danger during their lactation period of going down in the hindquarters from too heavy a drain on their tissues. A little crushed wheat or corn and bran made into a slop with buttermilk is an excellent prescription, especially for sows that are low in condition from suckling large litters of pigs. Heat the milk nearly to boiling point for a few minutes before adding the grain constituent; this will prevent any possibility of transmitting tuberculosis or other diseases to the brood sows through cow's milk.

### **Paralysis from Lumbago or Rheumatism.**

A board off the pig pen may permit a cold draught to blow on the back of the pig at night. This chilling of the loins may produce lumbago, or temporary paralysis of the muscles of the hindquarters and inability to walk. Comfortable sleeping quarters prevent these troubles (as well as pneumonia, &c.). It is a mistaken notion that the thick layer of fat with which pigs are provided is sufficient protection against winter storms. On the contrary, pigs often suffer severely from cold and wet if not properly sheltered and properly bedded. If the pigs are affected with lumbago and rheumatism, clean out the bowels by means of a brisk purge (two to four tablespoonfuls of Glauber's or Epsom salts administered in a pint of warm water). Cut down the protein constituent of the ration; feed thin, warm slops to which baking soda is added in tablespoonful doses. Apply hot packs to the loin and paralysed limbs, massage the muscles and apply a stimulating liniment with brisk rubbing. Bed warmly and cover the body of the patient with a thick horse rug if the weather is cold.

### A Peculiar Ear Disease Possibly Mistaken for Paralysis.

Reference has also been made on several occasions in these columns to investigations that have recently been carried out by H. R. Seddon, D.V.Sc., and H. R. Carne, B.V.Sc. of the Veterinary Research Station, Glenfield, New South Wales (as reported in the "Agricultural Gazette" of New South Wales), these investigations having as their objective the determination of the cause and effect of a peculiar disease technically known as suppurative otitis affecting the ear of the pig, the principal symptoms of which are the abnormal carriage of the head and the interference with equilibrium and sense of direction. This disease which, unfortunately, also is all too common in Queensland and is frequently mistaken for paralysis or as indicating the development of paralysis of the hindquarters, has been described by these veterinarians as follows:—

A condition has been noticed fairly commonly amongst young pigs in which the most prominent symptom is a peculiar alteration in the carriage of the head, which is accompanied frequently by unsteadiness of gait. The disease is seen usually in young pigs from a few weeks up to three or four months old. The reason for the relative infrequency of occurrence in older pigs is possibly that young pigs are more prone to catarrh (which appears to be the forerunner of the condition) and that affected animals suffer such loss of condition that they die or are killed as "runts" or "bad doers."

#### Symptoms.

The most characteristic symptoms are the abnormal method of carriage of the head and the interference with equilibrium and sense of direction. The head is twisted or rotated to one side or the other so that one ear (the affected one) is depressed, such depression becoming more marked as the condition advances. It is noticed that the animal, when walking about, tends to circle in one direction, this being towards the side to which the head is depressed. For example, if the left ear is affected, the head will be rotated to the left with depression of the left ear and "circling" will occur in the same direction. At times this tendency to circle is not apparent, but it is noticed that when moving, the animal does so with an awkward gait, whilst the head is moved from side to side in an unbalanced manner. Affected animals may also exhibit considerable difficulty in going straight up to the feeding trough, having to make several attempts before gauging the right direction, sometimes walking to one side of the trough and sometimes to the other. It has frequently been noticed that the condition is accompanied by discharge from the nostrils and eyes.

In advanced cases there are very apparent disorders of equilibrium, the gait becoming unsteady and somewhat inco-ordinated, and the animals may fall into the feed trough and be unable to get out again.

Affected pigs are usually found to be "poor doers" showing a scurfy condition of the skin, lack of lustre of the hair, and poor condition. The appetite is capricious. In some cases examination of the affected ear reveals a considerable amount of yellowish brown or brown sticky discharge adhering to the inner surface of the ear.

#### Cause and Lesions.

Examination of several pigs showing such symptoms has revealed the presence of a suppurative condition affecting the middle ear, and this may be the only demonstrable pathological change found on post-mortem examination.

The hearing apparatus, it may be mentioned, consists essentially of three parts:—

(1) The external ear, which is that portion visible externally. Its function is to collect sound waves and transmit them by means of a passage to—

(2) The middle ear: This is separated from the external ear by the tympanic membrane or "ear-drum." The function of the middle ear is to magnify the sound waves collected by the external ear and transmit them to—

(3) The internal ear: This consists of an intricate structure by which the sound impressions are transmitted to the sensory areas of the brain. The internal ear, however, performs another very important function—namely, the maintenance of equilibrium, it being by means of part of this structure that an animal keeps its balance. Disease of these deeper structures of the ear, therefore, frequently leads to an unsteady gait, twisting of the head to one side, or even to inability to stand at all.

Both the middle and internal ears are situated within the petrous-temporal bone of the skull and it is within this bone that the lesions responsible for the condition



are found. The petrous-temporal bones are placed immediately behind the articulations of the lower jaws and the skull, but a careful dissection by sawing open the skull along the longitudinal mid-line and removal of the brain is necessary to expose them properly.

In several cases so examined, it has been found that a thick, cheesy material is present in the cavities of the bulbous portion (*bullæ ossæ*) of the middle ear on that side to which the head has been depressed during life. Normally, these cavities in the bone have a honeycombed appearance, consisting as they do of small, empty spaces separated by thin plates of bone.

The accumulated pus in the middle ear tends to burst through the ear drum and discharge externally, giving rise to the sticky discharge which may, in advanced cases, be seen on examination of the passage in the external ear.

Examination of the pus shows the presence of bacteria, such as are commonly met with in other suppurative conditions in the pig. It is probable that in these cases they gain entrance to the deeper structures of the ear by way of a narrower passage (called the Eustachian tube) which leads from the back of the throat to the middle ear, and from the comparative frequency of nasal catarrh in young pigs, it is probable that this ear disease is an extension of this inflammatory process affecting the lining membrane of the nasal passages.

### Prevention and Treatment.

Once the condition is established, it is unlikely that any treatment will be of use. Syringing of the outer ear will remove the obvious discharge, but will not penetrate into the deeper structures from which the pus arises. While the discharge cannot be definitely prevented, all possible means, such as proper attention to cleanliness and housing, should be undertaken in order that chills may be avoided. Diet should also be attended to, as it is found that this also plays a not unimportant part in the causation of those diseases, such as catarrh (snuffles) and pneumonia with which the condition is frequently associated.

### More Efficient Feeding Necessary.

As will be noted from the remarks of the authorities referred to above, both in regard to the condition, paralysis of the hindquarters, and to that more recently described by Doctors Seddons and Carne, it is apparent that any form of treatment must be preceded by a general clean up of all the piggery buildings, yards, paddocks, &c., careful attention to breeding, and to the selection of reliable, healthy strains of pigs with which to stock up farm piggeries, to a more efficient system of feeding pigs, and to the use of mineral matters in the food given to pigs of all ages. It will be noted that special emphasis has been given throughout to the consistent use of liberal supplies of green food, lucerne, rape and barley, corn, pumpkins and melons, sweet potatoes and other root crops, grasses, and to any other green foods available on the farm.

### Mineral Mixtures.

The preparation and use of mineral mixtures is especially worth attention, for they will be found of great value in all seasons whether the supply of green food is available or not. In this connection the following recipes are suggested as being suited for use on all pig farms; the ingredients are reasonable in price, and are not difficult to obtain, and it should not be difficult for any farmer to arrange for a supply of these very necessary additions to the pigs' diet.

Mix together—Charcoal, 20 lb.; hardwood ashes, 20 lb.; coarse salt, 8 lb.; air-slaked lime, 4 lb.; flour of sulphur, 4 lb.; powdered copperas (sulphate of iron), 2 lb.

Prepare as follows:—First mix the lime, salt, and sulphur thoroughly, then add the charcoal and ashes. Dissolve the copperas in two pints of hot water and sprinkle over the whole mass, mixing thoroughly.

Keep some of this mixture before the pigs at all times in a strong box securely fastened in a weather-proof corner of the sty. Provide ample clean cold water at all times.

Lime water should be added to the morning feed, using half a pint to each two gallons of food. It will also pay to add a few ounces of sterilised bone meal to the food of the growing pig. This meal can be ordered specially for this purpose from any of the leading dealers in artificial fertilisers or from firms like Messrs. Thos. Borthwick and Sons (Australasia) Ltd., Wharf street, Brisbane, who also manufacture meat meal—a protein supplement of much value, and Bonolik, a mineral mixture. It may seem that these condiments are expensive and unnecessary, but in

actual practice they will give a handsome return on the outlay, though it might be difficult to demonstrate this in actual pounds, shillings, and pence.

The provision of these mineral mixtures will satisfy the pig's desire for mineral substances and will prove of added value as a tonic and appetiser. Salt licks, Vita licks, &c., also are now available on the market, and are becoming increasingly popular each year.

Minerals are just as important in the growth and development of the pigs as are proteins, carbohydrates, fats, vitamins, ash, water, and other nutrients, and more attention should be given to their provision, because, as a rule, insufficient quantities are present in the ration.

All pig rations, of course, contain some minerals, but there are practically no pig rations, unless specially prepared, that contain an adequate quantity to meet the requirements of the pig's body. Pigs need minerals for the building up of bone, for making muscle, for cell division, and for carrying on of innumerable physiological functions.

Without minerals, growth and development will be restricted, and the pigs will be less profitable. Many pigs suffer because they receive inadequate quantities of minerals, but no pigs suffer because too large quantities are given to them. Consequently, we should see that our growing pigs have access at all times to a good mineral ration balancer.

### **Corn Cob Charcoal.**

A good use for the corn cobs (cores) that have always been allowed to accumulate on most farms and around piggeries is to make charcoal of them. The cores in themselves do not make a good feed for pigs because of their high and coarse fibre content, and even if the whole cob (corn and core as well) is ground, it has yet to be proved that there is an added value in them. The core is practically indigestible fibre that only burdens the pig's digestive organisation and causes indigestion.

After the pigs have taken all the corn from the cob, however, the waste cores can be raked together into a pile and burned to the point when it is all a live mass of coals. Water should then be sprinkled over the pile to put the fire out, and the partially charred cores gathered up for the pigs. If there are any other "chips" available, or any old corn husks, these should also be gathered and burned, and added to the charcoal made from the cores.

Some of the farmers in the "Rivers" district of New South Wales have for years followed this practice, and in these days when suction gas plants are in use to such an extent, quite a large trade has sprung up for the charcoal burner. In this case large pits are dug in the ground and suitable lengths of logs are pulled into these; they are then fired, and after a time are covered with earth. In a few days' time a good class of charcoal results. These farmers have been making good money, and, at the same time, clearing their holdings.

It pays also to burn all old bones, waste timber, &c., and to thus convert these into a form of charcoal.

### **Provide More Water.**

The water supply should have special attention, for certain it is that many pigs do not have a sufficient supply of clean drinking water, and, as a general rule, pigs from a few days old upwards will be found to appreciate liberal supplies; it is surprising how much water a pig a month old will drink if he has the opportunity of securing a supply.

### **Careful Handling in Transit.**

Many pigs are handled so roughly in transit to market that they arrive at the markets, factories, &c., down in the back or otherwise disabled.

The writer has seen hundreds of cases like this in which the animals have been unable to walk from the railway trucks. The industry suffers heavy losses each year as a result. It should be the duty of every farmer to see that not only his own, but that all other animals in transit to market are handled carefully, and that no undue haste is made in rushing the animals into trucks or other means of conveyance.

### **The Condition of the Breeding Sow.**

Reference has been made above to the fact that frequently breeding sows suffer from paralysis of the hindquarters as a result of loss of vitality and condition from suckling a large litter of thrifty, vigorous pigs. In this regard it is necessary that



the breeder should know the correct condition in which to maintain his breeding sows.

Figures shown represent sows that are too low in condition to farrow and rear their litters successfully. These sows would, in all probability, suffer severely as a result, and their progeny could not be regarded as having the same chance as the progeny of the sows illustrated which represents the normal condition of breeding sows, the condition in which a sow should be maintained for best results; sows that are too fat are likely to have trouble at farrowing time, and their progeny will frequently prove to be weak, puny, and unable to battle for themselves.

The importance of diet and the necessity for careful attention to all details of management are strikingly illustrated in the plate from Henry and Morrison's latest book on "Feeds and Feeding."

### **Overfeeding Young Pigs on Corn—A Cause of Paralysis of the Hindquarters.**

The importance of properly balanced rations cannot be too strongly stressed. Many bacon pigs suffer from paralysis of the hindquarters as a result of being overfed on a ration consisting almost exclusively of corn and water or even of corn and milk; in fact, many authorities condemn the use of corn as a food for young pigs, but the writer's experience demonstrates that, provided corn is fed in comparatively small quantities during the early stages and is well balanced up with liberal supplies of milk, green stuff, &c., that it can be fed to very considerable advantage to all classes of pigs. In these days there is no demand for heavy fat bacon, hence there is no profit in over-feeding pigs on expensive grains, though some grain is necessary, especially in the case of young growing pigs.

### **Departmental Suggestions.**

Paralysis in pigs is brought about by several causes in addition to the other causes referred to above—viz., deficiency of vitamins, &c. In these cases the following lines of treatment are suggested.

### **Treatment.**

If due to rheumatism, see that the pigs are housed at night in a dry place, and allowed to sleep on wood flooring instead of on concrete or earth. Give daily salicylate of soda 15 to 30 grains, and bicarbonate of potash 1 to 2 drachms, in the food or as a drench.

If due to worms give, in the food or as a drench, 1 teaspoonful of oil of turpentine, 20 drops of perchloride of iron, and 3 or 4 oz. of raw linseed oil. This is sufficient for 50 lb. body weight.

It should be given after the animal has been fasting for some hours, and can be repeated several times, with an interval of three or four days. When due to feeding, as mentioned above, stop the corn and give once daily in a mixed diet or in milk 1 dessertspoonful of the following powder for every 100 lb. body weight (after it has been well mixed and powdered):—Sulphur 2 oz., sodium bicarbonate 4 oz., sodium sulphate 2 oz., black antimony 2 oz., sulphate of iron 1 oz., wood charcoal 2 oz.

A useful mineral mixture well worth trial also is made up as follows:—Add 1 dessertspoonful of the following mixture to the food of each pig daily:—Sulphate of iron, 1 part; sulphur, 2 parts; sterilised bone meal, 10 parts. Very young pigs should receive about half these doses. The following excerpt is also of interest in studying this peculiar disease, Paralysis of the Hindquarters.

### **Causes.**

When asked why pigs go down behind and suffer from a form of paralysis, Dr. K. W. Stouder, an Extension Service Specialist at the Iowa State College, U.S.A., said—

Weakness of the legs and back to such an extent that the animal is unable to stand is commonly seen among pigs. It is seen more often in recent years, perhaps, than it was some years ago.

We must not assume that it is all caused by the same thing, nor that all cases are exactly alike. In fact, they can easily be divided into at least two groups, the old sow that goes down and the growing store pig. Most sows do down after suckling a vigorous litter of pigs, and such cases are usually due to a lack of enough minerals, proteins, and vitamins in the rations to support the litter she raises and to provide for her own body-maintenance needs as well.

Many of these cases recover as the experienced feeder knows, if the patient is put on a ration of whole cow's milk every day, as it supplies the deficiencies, but it is more important to remember that this type of going down behind would not have occurred had the food ration been well balanced during the gestation period and while she was suckling her litter.

Young pigs may also go down because of the unbalanced rations, particularly it seems if the ration is low in mineral content and of the vitamins so essential to good health. It may also result from generations of breeding and selection, together with forced feeding for early maturity, rapid gains and excessive fat production, disregarding constitution, good bony framework and vigour. Cases of this kind are common, we believe, and they strongly indicate why these animals and their close relatives should be discarded as breeding animals to perpetuate the herd, for in such cases predisposition has much to do with its occurrence. Its occurrence one generation after another in certain families can thus be accounted for in part at least.

Some animals that go down show deficiency of bone; some show degeneration of nerves that control the muscles of the back and legs; others are found to suffer disease of the bony surfaces that come together at a joint, particularly where the thigh bone attaches to the body. These lastnamed cases of diseased joints may be the result of navel infection during the first few days after birth and could have been avoided had the pig been farrowed in a very clean place and kept under the cleanest surroundings, together with iodine or other antiseptic treatment of the navel until it dried up.

### Difficulty of Diagnosis.

The treatment of these cases gives variable results, perhaps depending first upon the difficulty of diagnosing with certainty the exact trouble in each case presented for treatment. Some cases improve on a mineral mixture, especially if given calcium phosphate, and others do better on spoonful doses each day of cod liver oil because the latter is rich in vitamins.

It is suggested that breeding animals and growing animals be given well balanced rations, so far as providing plenty of protein is concerned in relation to the fattening foods; that minerals be kept available and a mixture of equal parts of air-slacked lime, salt, and bone meal by weight serves as good as any.

### Preventive Measures.

When young pigs are born, apply tincture of iodine to the navel daily until it is dry. Don't keep even the relatives of the pigs that show this trouble for breeding purposes. When it occurs, give whole milk, cod liver oil, calcium phosphate, and carrots, if you have them available, in addition to a well-balanced ration and some cases will recover, but there are those that never get up though appetite and general health otherwise seem good.

There are cases, of course, in which the ailment is due to accident. The treatment for these cases must be on common-sense lines, and must aim at keeping the animal in good heart and in otherwise healthy condition. There are other cases in which intestinal worms, and possibly kidney worms, are the direct or the indirect causes; these cases must receive a course of treatment that will tend to clear them of the parasites and put them in a condition to battle against future infestation.

Another American authority has this to say on the subject:—

“Professor L. A. Weaver, swine specialist of the Missouri (U.S.A.) Agricultural College, states that the two minerals most frequently lacking in the food for pigs are calcium and phosphorous. Experiments have shown that pigs are able to use these minerals when supplied either in an organic or inorganic form. In other words, ground limestone, which is calcium or lime phosphate, serves as well as a source of phosphorous as does wheat bran, where the phosphorous is in an organic form. Calcium may be satisfactorily furnished in almost any form, such as lime, ground limestone, or bone meal.”

Included among suggested remedies by other authorities as well as by our own experience in handling animals in a paralysed condition are as follows:—

Where animals have the benefit of a grazing area, it would be an advantage, if possible, to subdivide this, allowing them to use only one portion at a time, the other portion resting and sweetening up meantime. Where the ground is at all swampy or low lying, some endeavour should be made to drain the area. It is on these low lying, swampy areas where infection from kidney worms or from intestinal worms would be suggested, hence the advisability of changing the pigs from one



pasture to another frequently. Pigs infested with kidney worms, however, seldom recover normal condition, though they may appear perfectly healthy and have good appetites. There is, unfortunately, no external indication of the infestation unless paralysis be accepted as a definite symptom.

### Results of Experiments.

A series of experiments carried out at one of the Agricultural Colleges in England demonstrated that pigs fed on an exclusive corn diet have a weaker bone than those having a better balanced ration. If, therefore, animals are receiving corn alone, other foods, especially skimmed milk and green foods (with minerals), should be added to make up the deficiency.

Within the last year or two, a very extensive investigation overseas regarding this disease, has demonstrated among other things that pigs affected with paralysis of the limbs have a broken down condition of the nerves that supply the muscles of the hind limbs with innervation. While it is possible that this is not always the case, still it was found in a large percentage of the patients examined, and as degenerated or broken down nerves cannot be restored to their full function, we are forced to come to the conclusion that paralysis of the hind parts of the pig is, in many cases, incurable. The cause of this breaking down of the nerves is not known, and, therefore, intelligent curative treatment cannot be recommended. Preventive treatment is always somewhat vague, but it is always well to separate the diseased from the healthy pigs, to disinfect all pens by spraying them or by the application by hand of limewash, and by avoiding the use of affected pigs or pigs closely related to them for breeding purposes, as there is some danger that there may be a hereditary predisposition to the disease.

In cases due to accident or injuries, common-sense methods must, of course, be employed in treatment. Meanwhile, the animal requires careful housing and a course of medicinal treatment to keep the bowels and bladder free. The food should be of a soft, nourishing nature. Allow water and green food also.

The use of cod liver oil appears to have the general recommendation of a number of investigators handling paralysed pigs. This oil given at the rate of one teaspoonful per pig (from 6 months old upwards) daily, mixed in the food is suggested.

Another remedy recently suggested in dealing with the disease as one due to a deficiency of mineral matters and to a lack of vitamins, indicates that something needed for nutrition is absent in the foods in use for the affected pigs. The Colorado Agricultural College authorities in answering an inquiry on these lines recently give this advice, "That as the foods being fed to the animals under review had on analyses shown a deficiency of minerals, and were particularly deficient in vitamin B., it was recommended to try feeding the pigs on a ration consisting of plenty of milk and carrots, using new milk for a start and skimmed milk later. Results under experimental work with this ration in case of pig paralysis have been remarkable.

### An Incurable Form.

Paralysis resulting from tuberculous bones is incurable, and as the carcasses would not be fit for human consumption the sooner they are destroyed the better. It is, of course, possible to test pigs with the tuberculin test, though this is not a very satisfactory business with pigs for the reason that it must be carried out by a competent veterinarian and the expense incurred would hardly be justified except in the case of very valuable stud pigs.

If there is any conclusive evidence that the animal is tubercular, he had better be destroyed immediately and be burned to ashes on the spot on which he is killed.

In addition to paralysis resulting from tuberculous bones, any abnormal condition affecting the spinal cord, such as abscesses, tumours, parasites, or even diseased and softened bones may be a primary cause for the trouble. Paralysis immediately following farrowing is, in our experience, not common, but it may result from a weakened condition of the animal and in cases of this description the preventive measures indicated should be adopted, as also in cases attributed to lumbago and rheumatism.

### Early Signs of the Trouble.

As a rule, paralysis comes on gradually, being indicated in the first instance by a wobbly, uncertain gait, the animal failing to control its movements, particularly if hurried or if the animal is turning around. Walking gradually becomes more

difficult as the weakening of the nerves and muscles of the hindquarters progresses, but in almost every instance the appetite and general health of the animal is not affected, hence any abnormal change in the appetite or any other indication of sickness must be looked to as premonitory of other and perhaps more serious troubles. Constipation must be relieved by repeated doses of Epsom salts or castor or linseed oils. Massaging of the affected muscles and the application of liniments as referred to above are suggested.

Finally it is suggested that in every instance where the trouble appears in more than one animal, or where it appears that ordinary care and attention is ineffective in bringing about the desired result, the services of a qualified veterinary surgeon should be requisitioned to take complete charge of the case.



PLATE 133 (Fig. 1).

A typical case of Paralysis of the Hindquarters. It will be noted that although paralysed in the hindquarters to the extent that she cannot raise her hind legs or use them in any other way, the animal has not lost condition. Strangely enough, the appetite is not usually affected provided the animal is otherwise normal.



PLATE 134 (Fig. 2).

These pigs are suffering from a very severe attack of paralysis of the hindquarters. The pig on the right is still able to move about but with great difficulty and a very uncertain gait, but as is the case with the other two is quite unable to control its movements. The photograph is of pigs fed on a ration containing a very low mineral content. Stiffness and partial loss of control followed after about six weeks feeding. In the same experiment a second lot fed the same



ration plus five times as much calcium phosphate as lot No. 1 had gained 89 per cent. more weight and were not affected with paralysis. Both lots were afterwards slaughtered. The skeletons of the pigs illustrated in Fig. 2 weighed 1,193 grams. That of the pigs fed in separate pen and which were given sufficient calcium phosphate weighed 2,371 grams, or 100 per cent. more.

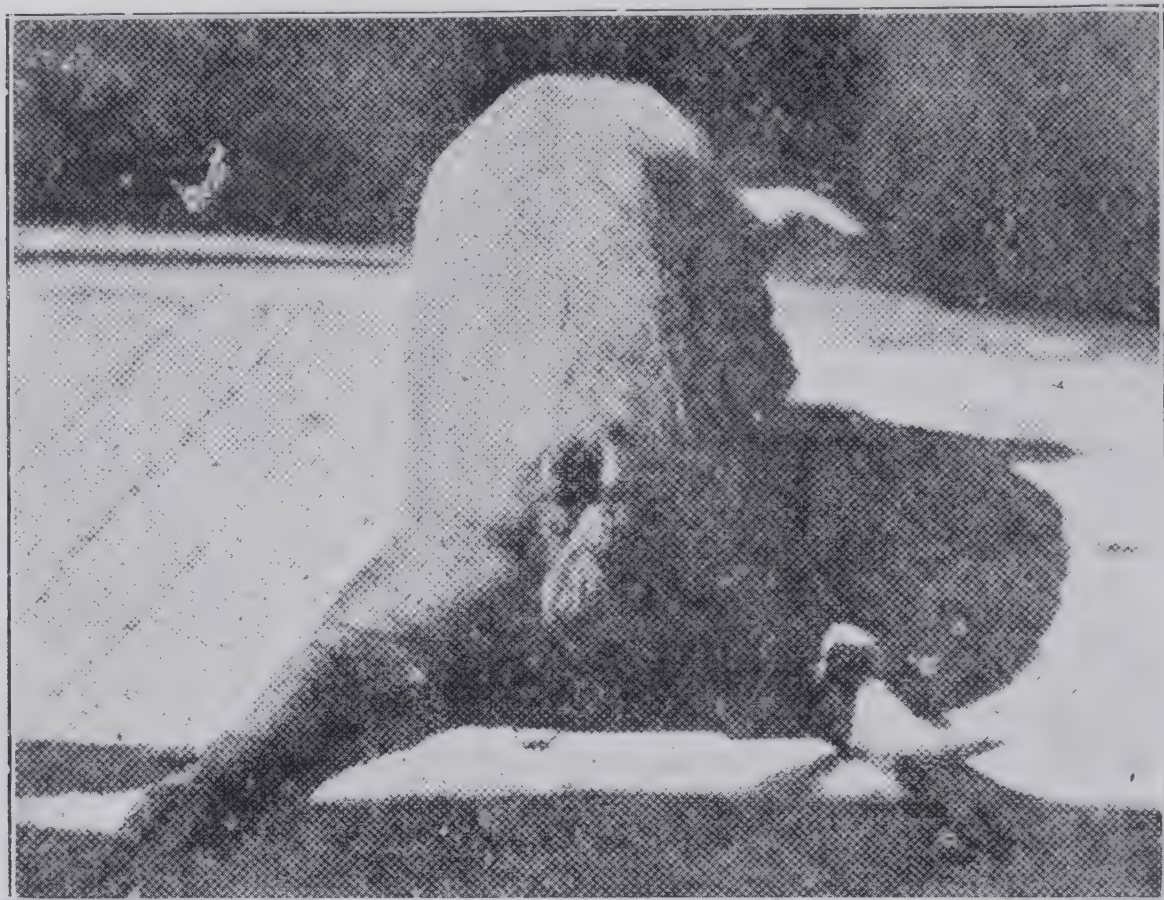


PLATE 135 (Fig. 3).

Symptoms of posterior paralysis (breaking down in the back).

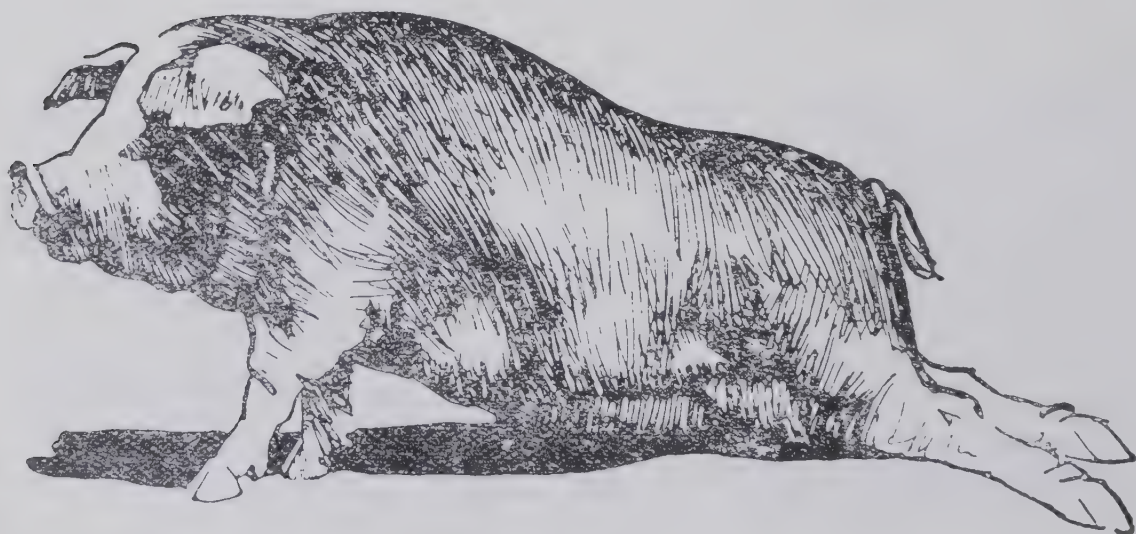


PLATE 136 (Fig. 4).

Illustrating a pig that has been injured in transit and unable to travel. Many pigs arrive at our bacon factories and saleyards in such a condition, resulting in their market value being reduced probably 75 per cent. This emphasises the necessity of giving careful attention to the animals in every stage, particularly in transit.





PLATE 137 (Fig. 5).—PIGS SUFFERING FROM SEVERE CASES OF RICKETS.

These pigs received a ration of white corn and skim milk, without pasture. Note the paralysed condition. The pig on the left died within a week after the photograph was taken, while the one on the right gradually recovered when cod-liver oil was added to the ration.

(From Henry and Morrison's "Feeds and Feeding.")

These pigs are suffering from an advanced form of the disease Rickets, a similar condition to that referred to as paralysis of the hindquarters. The reference to this illustration emphasises the necessity of careful feeding and the provision of a liberal supply of mineral matters and vitamins in the food.

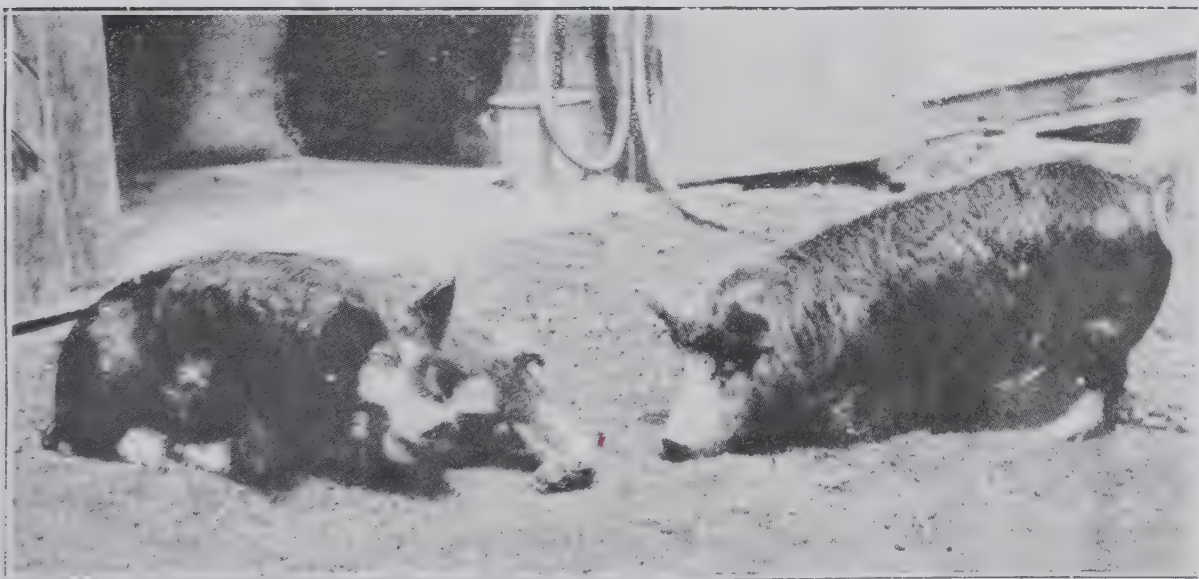


PLATE 138 (Fig. 6).

These pigs were raised at the Wisconsin Station (U.S.A.) on grain and grain by-products, without pasture or any other food. They became stunted, and finally developed the severe paralysis depicted. The proteins in such a ration are unbalanced in composition; there is a deficiency of mineral matter, especially calcium; and there may be a lack of vitamins. (From Hart, Wisconsin Station, in Henry and Morrison's "Feeds and Feeding.")



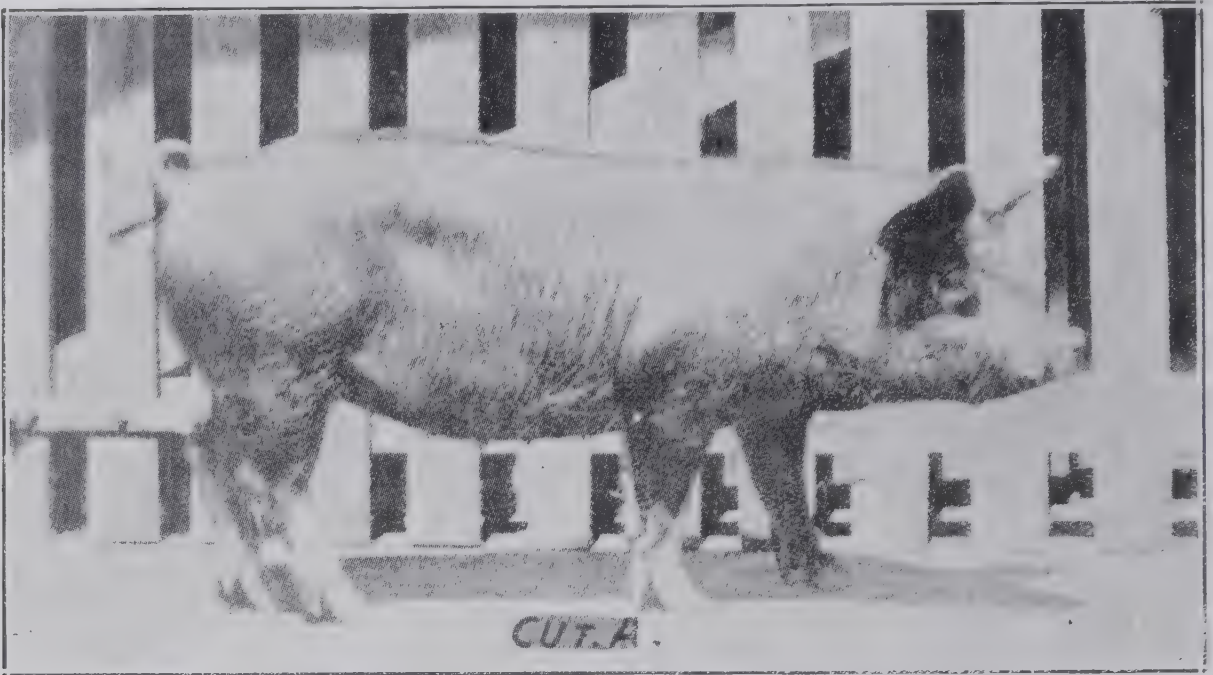


PLATE 139 (Fig. 7).



PLATE 140 (Fig. 8).

Figs. 7 and 8 are of farm sows of uncertain breeding too low in condition to prove satisfactory. The young sow in Fig. 7 is too low in condition to mate to the best advantage, while the sows shown in Fig. 8 are too low in condition to rear their young satisfactorily. Sows in such a condition frequently suffer for many months after farrowing, and even if they do not develop paralysis their progeny are more liable to disease and to abnormal troubles than the progeny of sows in medium breeding condition. Sows of the types illustrated should not be retained as breeders as their breeding is doubtful and there are plenty of better type sows available at prices comparatively low.

Fig. 9 is of a Poland-China sow too fat to prove satisfactory as a breeder. She is carrying far too much condition and would be liable to suffer from troubles such as heat apoplexy as well as paralysis. This photograph was taken a few days after this sow arrived from America some years ago. Her condition was in part due to the generosity of the passengers on the same steamer who were anxious that the pigs should arrive in the very best of condition. The sow proved a failure as a breeder largely as a result of this overfattening.



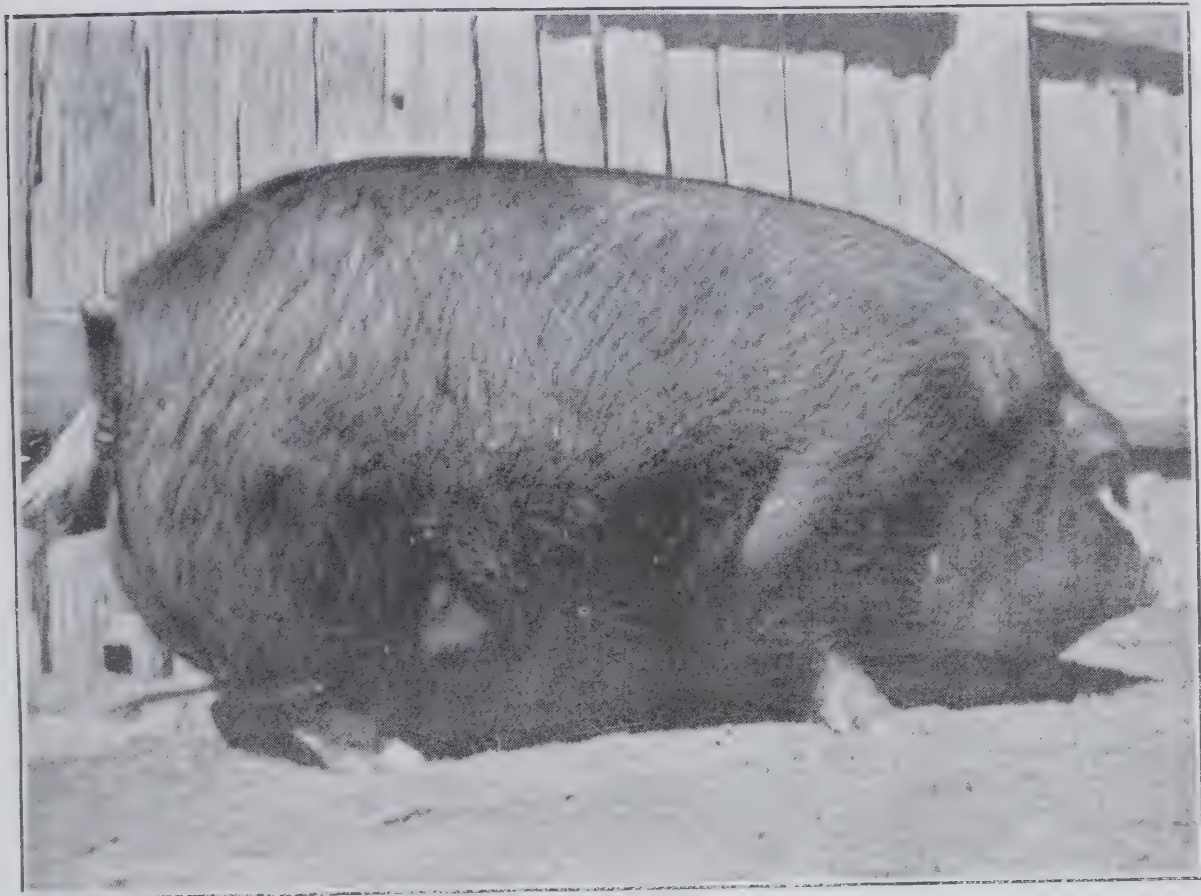


PLATE 141 (Fig. 9).

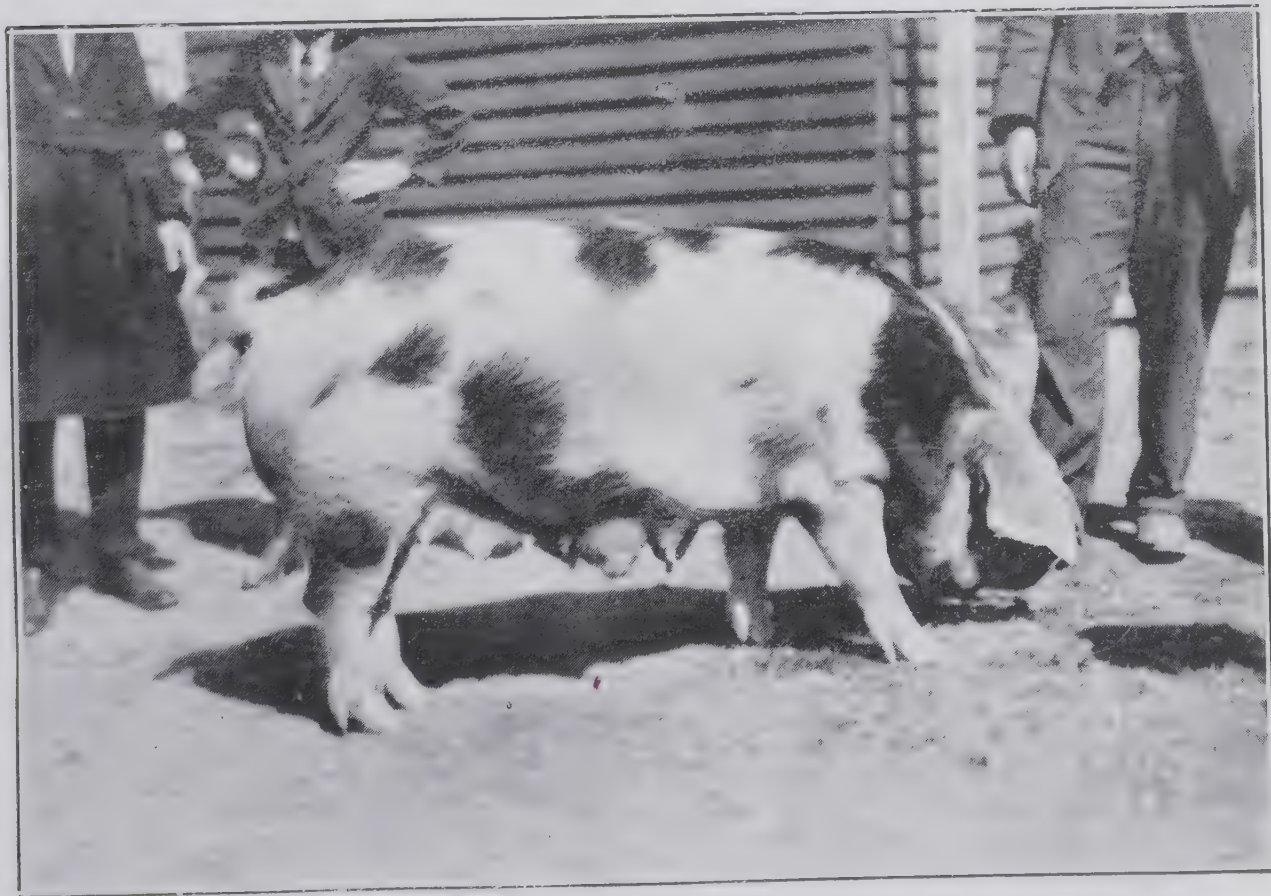


PLATE 142 (Fig. 10).

Fig. 10 is a prize-winning Gloucester Old Spot sow at the Brisbane Show, 1925. This sow was rearing a large litter of active, vigorous pigs approaching weaning age. She is in ideal condition for a sow at this stage, for it is not to be expected that a sow will hold her condition whilst suckling. This emphasises the necessity of having the sow in proper condition prior to farrowing time in order that she may be able to do justice to her pigs.





PLATE 143 (Fig. 11).—A GROUP OF SELECTED BERKSHIRE BROOD SOWS.  
Sows of this description always realise good values in normal seasons, and are worth special care.

Fig. 11.—Berkshire sows in medium breeding condition, the condition conducive to satisfactory results. This is the ideal condition for in-pig sows, for they will farrow with little or no trouble and be able to rear their litters satisfactorily and without risk of going down in the hindquarters or suffering from other diseases.

### TICK PARALYSIS IN PIGS.

A correspondent informed us recently that he had a well-grown, three-months-old sow that had become suddenly very ill; she went off feed and lay down. On rolling her over, the owner found a whitish coloured tick (known as a dog tick), and he sought information as to suitable treatment for an animal so affected.

Another correspondent advised: "I have recently purchased three first-class Middle York sows, three months old. They were in perfect condition when they arrived here, and have been well fed and cared for since, but two days ago I noticed that two of them were suffering from some ailment or other; they would not come up for their food, were very stiff and 'dopey,' and appeared to be getting worse. I am at a loss to know what is wrong or what to do . . ."

The following information was supplied:—The fact that the ailment suddenly manifested itself in the pigs suggests that it may be attributable either to bush-tick poisoning or to severe constipation. The common bush-tick fastens itself on the animal, usually about the head, ears, neck, or under the foreleg, and the poisonous effect of its bite causes a temporary paralysis of the hindquarters (particularly) and frequently severe constipation. These ticks (*Ixode holocylus*) are comparatively common along the coastal districts of New South Wales and Queensland, and one species is found inland. They generally attack dogs, poultry, and pigs; but other animals are not by any means immune, nor even are human beings. After attaching itself to the animal the tick forces its feeding apparatus through the skin (it usually selects a thin-skinned portion of the body for its temporary abode) and commences to suck blood from the affected part. The tick gradually fills up, increases to two or three times its normal size, and at the same time apparently injects a certain amount of poison into the animal, the result being that the animal goes off its food, is disinclined to move from its bed, and when disturbed appears stiff, sickly, and

paralysed, particularly in the hindquarters (later the forequarters may also be affected), breathing becomes laboured, and there may be a discharge from the nostrils; bowels are inactive and severe constipation follows; kidneys and bladder become inflamed and congested, and the urine is scanty and high coloured. If not attended to the animal gradually becomes worse, loses condition, and death occasionally results.

Careful search should be made for the ticks, and if found they should be cut off close to the skin with a sharp pair of scissors, or, better still, with a sharp razor. Do not attempt to pull the tick away. After cutting the tick off, rub the affected spot with antiseptic ointment, kerosene, or Stockholm tar.

Remove the pigs to a pen where they can be attended to regularly. Give each pig two tablespoonsful of castor oil in a half-cupful of warm milk as a drench immediately. About three hours after give each pig a mixture of one dessertspoonful of aromatic spirits of ammonia and ten drops of nux vomica (the chemist will make this up for you) in a small cupful of warm milk.

Compel the animals to take exercise; provide dry and warm, clean sleeping quarters, and treat the patients kindly for a few days. Give soft nourishing foods—milk, pollard, a bran mash, and similar foods.

Another remedy that has proved successful is as follows:—Give castor oil or olive oil as already advised, and an hour later give six drops of tincture of aconite each in a small quantity of warm water. Three hours later, if the patients have not recovered, give three drops of the same drug and repeat until four doses have been given; do not give more than four doses. Follow the instructions with regard to feeding and housing.

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### GROS MICHEL BANANAS.

This variety was introduced by the Acclimatisation Society, Messrs. Howard Smith and Sons, and this Department. Howard Smith's established a plantation in Mourilyan district.

Plants were propagated from single eyes from the departmental introduction and planted in various parts of the State, but for pertinent reasons were not considered suitable for general planting. Howard Smith's plantations were completely devastated by a cyclone (the Gros Michel is a very tall-growing variety). Mr. Hogg, Cardwell, propagated sufficient stock to plant several acres and found the variety difficult to handle, the pseudo stems each requiring support when bunching. Afterwards, a cyclone practically eliminated them.

Thrip is a pest in parts of North Queensland, and to dust the young fruit as required for this pest would mean carrying a step ladder to provide access to the bunches. The detrimental influences of high winds on this variety are severe and those of a cyclone are complete demolition. For this reason the Gros Michel has practically gone out of cultivation in Fiji and has been superseded by the dwarf-growing Cavendish.

The Gros Michel being essentially a tropical variety makes comparatively slow progress in the South. Its fruit being less curved has the advantage in packing and to some extent also in size, but under equally favourable conditions the weight of fruit from a given area is in favour of Cavendish, which also comes into bearing much earlier than any of the tall-growing varieties.

Possibly the Gros Michel may be a better carrier, but regarding the Southern Queensland product, it must be remembered that we are producing a tropical fruit under sub-tropical conditions. The effect may be gauged from the fact that bananas from Currumbin were found unfitted to rail beyond Melbourne, whereas they were satisfactorily sent to that destination from Cairns (also to Adelaide, though the latter were packed in a decidedly green stage).

That the Gros Michel is subject to "Panama disease" is a serious matter for consideration. This disease practically wiped out the Sugar banana, and has seriously influenced the production of the Lady's Finger variety. It may also be mentioned that an American investigator, Dr. Reinking, recently visited Queensland in search of a tall-growing banana, which was not susceptible and possessing a more sturdy stem to supplant the Gros Michel. Observation and experience suggest the Cavendish variety being quite immune from the disease, and its dwarf habit distinctly favours its planting. Before general planting of the Gros Michel can be recommended, even in the most favoured and sheltered northern districts, it should receive further trial, and this not exceeding 25 per cent. of the area of any plantation.—G. W. WILLIAMS, Acting Director of Fruit Culture.



## PUBLICATIONS RECEIVED.

### PIG TESTING AND RECORDING FOR THE PURPOSES OF ADVANCED REGISTRY.

In an extremely interesting and informative brochure under this heading from the pen of Messrs. H. R. Davidson, M.A., Dip. Agric. of the School of Agriculture, Cambridge, England, and A. D. Buchanan Smith, M.A., M.Sc., of the Animal Breeding Research Department of the University of Edinburgh, an extensive outline is given of recent developments in animal breeding in its relationship to the registration of stock and the recording of pedigrees generally.

Though written by authorities exceptionally well versed in the scientific aspect of stock breeding and dealing with a technical subject, "Pig Testing and Recording" is extremely practical, and is written in a way that will readily be understood by producer, student, and expert alike.

In the opening paragraph attention is drawn to the belief that "the full benefit of the recently elaborated science of genetics or breeding will not be obtained until some standards of production are established . . . . That while the pail (or milk bucket) is the chief measure of the productivity of the cow, there are other things which must be considered before her value can be rightly gauged. With the hen the number of eggs laid during the year does not convey an adequate impression of the economy of any particular fowl. All the same, "to have any sane standard of production" (says the author) "is better than to have none. To have a standard that is easily measured gives the breeder of that type of stock a great advantage."

After stressing the importance of the great progress made in breeding practice within the past fifteen years, and after comparing results and urging an extension of the practice not only to the cow and the fowl but to the pig . . . . which next to the dairy cow is the most economical producer of food . . . . readers are supplied with a brief historical record of this progress and of the inauguration of a permanent system of stock recording and registry, and the latest extension of this scheme to recording not only the pedigree but the productivity of the pig. A pig with a pedigree, it is said, implies that it is aiming at something higher than the average. A pig with a record implies that it has achieved something higher than the average.

### Origin of Pig Testing and its Development Abroad.

Pig testing as at present understood appears to have originated in Denmark, where in 1896 the first tests of thriftiness and quality were carried out on the farms of the breeders. In 1907 the first testing station was opened in that country, and since then two more have been established in different parts of the country. Some time previous to the introduction of testing, the Government had instituted a number of subsidised "breeding centres," something on the lines of the poultry stations in the British Isles, and in view of the rather strict supervision of these herds by State officials very full information relating to the breeding capacity of the stock was obtained by means of detailed private herd registers. The type testing station added to this breeding information details of the carcass quality and the economy of food consumption.

The small size of Denmark and the way in which the breeding centre scheme was organised resulted in the fact that a great part of the pigs fed commercially in the country originated from the breeding centres, and so the live stock authorities have been able in this way to keep considerable control over fecundity (the power to produce thrifty litters freely, regularly, and abundantly), quality, and thriftiness of the commercial pigs used throughout the country.

After drawing attention to the difficulties that would be experienced in Great Britain in inaugurating similar type testing stations, &c., the authors proceed to discuss the position in Sweden where the system has also been in successful operation. In general the methods followed in Sweden and the station established there has been "modelled very closely upon the Danish ones," and although only completed in 1923 it has already produced three most interesting reports.

A perusal of the results published indicates that "productivity" not only refers to increased production of "typy" pigs, but that considerable attention has been given to grading of the finished product, this grading having special reference to length and depth of side, measurement of back fat, thickness of side, &c. The fact that even in grade III, the back fat was only 1.80 inches suggests that sides with anything more than 2 inches of back fat are not good enough to be exported from Sweden.

Attention has been given also to thickness of belly, the objective being to increase the streakiness and commercial value of this portion of the carcass especially in its relation to the "side." Especially interesting is a comparison between hog meat (the meat from a castrated male) and gilt meat (the meat from a sow pig). When all the pigs are divided in this way, it is found (the authors say) that in the gilts (sows) the back fat is thinner and the streak thicker than in the case of the hogs. One interesting suggestion is made in this connection, and that is—that as the hogs grow rather faster and fatten at an earlier age it is conceivable that they might be used to best advantage for pork while the gilts could be kept back for bacon. Another interesting conclusion is stated in that with regard to depth of side the figures show that 59 per cent. of deep pigs are placed in grade I. as against 23 per cent. of the shallow ones, but what is perhaps more unexpected is that the deep pigs turn out to be also the long ones. The authors add that it is in view of the applicability of these results to pig breeding in general and the possibility of further useful information being obtained in the way that we think the Swedish type testing station results are so interesting.

References are also made to the pig testing stations of East Prussia and Hanover in Germany, at which valuable work is being carried on. In Canada and also in the United States of America numerous experiments have been carried out and much valuable data recorded; these experiments are of an intensely practical nature, and include the "Ton Litter" scheme, through which so much has been done to popularise pig production. That the Ton Litter Contests have done good by attracting attention to the need for some more accurate measure of pig production cannot be denied. Space is given in the report to the judging and recording of utility points, to carcass and bacon competitions, to pig recording schemes in Great Britain, to a criticism of present methods in re type testing stations, and pig breeding societies. References are made in the conclusions formed to (a) Government grading of pigs, (b) pig recording societies, (c) type testing stations, and of (d) proposed schemes for the extension of operations in England. Finally an outline is given of "How to start and develop the scheme."

"Pig Testing and Recording" is a most informative and useful record which we recommend to the consideration of every pig producer. Copies may be obtained from the National Pig Breeders' Association, 92 Gower street, London W.C.1.

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### THE 1927-28 "PIG BREEDERS' ANNUAL."

The seventh volume of the "Pig Breeders' Annual and Year-book," recently to hand, and published by the National Pig Breeders' Association of England, to whose courteous secretary (Mr. Alex. Hobson) we are indebted for copies, is one of the most up-to-date publications of its nature we have yet received. The "Annual" is in itself quite an attractive and up-to-date publication, profusely illustrated, covering 180 odd pages, packed full of interesting and informative matter of value to the up-to-date farmer in his every-day round of duties.

A feature of the volume is its information on many of the leading studs of the old world and of people interested in the preparation of meals, measures, and medicants, such as have been found to be of value in encouraging more rapid growth and earlier maturity in the several grades of pigs for which they are prepared.

Sir Daniel Hall, K.C.B., LL.D., D.Sc., F.R.S., in a thoughtful and informative foreword refers to the importance of "type" in the production of various grades of stud stock.

"The criticism," he says, "is often made that we have too many breeds of pigs in Great Britain." In this way he sets up a useful argument which, while favouring the bacon type as far as market pigs are concerned, does not necessarily condemn any particular breed or cross. It is certainly true that to be successful in marketing pig products in any part of the world, market requirements in the way of type, quality, and quantity must be kept strictly in view.

Professor Basil Buxton, M.A., F.R.C.V.S., contributes a useful and well-written article on "Some Parasitic Diseases of Pigs," which every farmer would do well to carefully study.

Major E. R. Orme, Marketing Investigator for the Ministry for Agriculture and Fisheries, selects for his theme "The Need for Organisation in the Pig Industry," and draws a useful comparison between past failures and future prospects in this most important branch of husbandry. His comparisons between the Danish and English conditions are very instructive, and his conclusions are based on a wide knowledge of the subject gained, we are sure, from a field much wider than those to which he makes reference in his report.



Agricultural Shows is the subject chosen by Mr. W. F. S. Hodgson, his discussion being along the lines as to whether they can be improved from the pig exhibitors' standpoint.

Messrs. John Golding, D.S.O., F.S.C., and W. B. Morris, B.Sc., devote their space to a discussion on "Some Experiences in the Course of Pig Feeding—Experiments at the National Institute for Research in Dairying," experiments by the way that have led to numerous important suggestions being brought forward for the benefit of readers generally.

"The British Pig Producer V.—The Dane" is the subject on which Wm. Todd, M.A., has some interesting conclusions to discuss. His arguments are sound and well worth careful study.

In a very thoughtful and detailed report Messrs. H. R. Davidson, M.A., Dip. Agric. of the School of Agriculture, Cambridge, and A. D. Buchanan Smith, M.A., M.Sc., of the Animal Breeding Research Department, University of Edinburgh, discuss "Pig Testing and Recording for the Purposes of Advanced Registry."

These authorities are so well and favourably known, and their writings are appreciated by such a wide circle of readers, that their opinions on this most important subject will form a topic for conversation and be appreciated by readers in every part of the world.

"The Potentialities of the English Co-operative Bacon Factory Movement" are discussed in detail by Mr. F. J. Suhr.

The reference to the "Standardisation of the Pig" is especially worthy of note. On the production side of the business, and dealing more particularly with English conditions, Captain Godfrey Phillimore, M.A., suggests ways and means "How to avoid a loss with Harley meal at £12 a ton and bacon at 13s. 6d. a score." To Australian pig farmers this article is a revelation, and will be perused and discussed with more than an ordinary share of interest.

"Judging Pigs in South America," by Mr. W. V. Judd, will be read with interest, as also will the detailed discussion by Mr. John Hammond, M.A., on "Growth and Conformation in the Pig." Mr. Hammond is associated with the Animal Nutrition Institute of the School of Agriculture, Cambridge, and is a well-known authority.

"Pig Production in Norway," by Mr. O. C. Hersoug, with its informative illustrations and useful comparisons, throws light on the successful attempt of the Norwegian people to make pig farming a profitable venture there.

Referred to as one of the greatest living authorities on all questions pertaining to costings, accounts, &c., Dr. Arthur G. Ruston, D.Sc., of the Leeds University, discusses at length and in complete detail "The Economic Value of Pigs on the Farm," an article worth a special place in the library of every farm whether he be specially interested in pigs or otherwise.

"The Development of the British Pig Industry," to which Mr. Jas. H. Stansfield makes extended reference, is of special interest in that it draws attention to the immensity and importance of pig raising, not only in the British Isles but in other parts of the world. The fact that Great Britain spends annually £60,000,000 sterling on the purchase of pig products indicates that Mr. Stansfield has a very large subject on which to work.

"Railway Rates for the Carriage of Pigs," by W. Hallas, a well-known authority on these matters, gives a great deal of useful information condensed into a very small space that has special reference to conditions in the old world more than to countries overseas. Nevertheless, the article is not without interest even in overseas dominions where also pigs are carried by rail over many thousands of miles.

"Pig Breeding in Australia," by Mr. E. J. Shelton, H.D.A., Instructor in Pig Raising to the Department of Agriculture and Stock in Queensland, will be read with special interest by a wide circle of readers. The article discusses the development of this industry under Australian conditions, and the possibilities of export of pig products to markets outside her own borders, as well as to an extension of local markets throughout the Commonwealth. Mr. Shelton is well known throughout Australia as an authority on this subject, and invites correspondence from interested readers in any part of the world.

"Wye College Pig Husbandry Research Centre," as discussed by Mr. V. C. Fishwick, P.A.S.I., N.D.A., N.D.D., describes the operation and experiments carried out at this important centre of activity, and is of interest.

"The Breeding of Commercial Pigs" on a mixed farm by P. Webster Cory, and "Pig Breeding of Yesterday and To-day" by Mr. C. L. Coxon, are both articles from the pen of practical husbandmen which will be read with interest.

“The Advantages and Simplicity of Weekly Weighings,” by Captain C. L. Stiff, is especially worth careful note, for only by detailed attention to this most important part of the business can the farmer hope to secure the maximum reward for this industry. The very fact that the job is such a simple yet such an important one will appeal and open fresh avenues of thought in the minds of many pig farmers.

“The Pig Breeders’ Annual” is recommended to every pig producer. Published at 92 Gower street, London W.C. 1, copies may be obtained through booksellers or direct from the secretary.



*Photo.: Dr. L. St. V. Welch.]*

PLATE 144.—CITRUS FRUIT IN THE WEST.

A prolific Lisbon lemon-tree in the Station garden on “Retreat,” the property of Messrs. Button Bros., near Jundah.

“MUST HAVE THE JOURNAL.”

*Writing from Rose Hill, a farmer subscriber says: “I enclose postal note for 3s. for which please send me the ‘Queensland Agricultural Journal’ for a further three years.*

*“A farmer requires to keep in touch with all the latest scientific methods, and to do this he must have the Journal.”*



## Answers to Correspondents.

### Destruction of Weeds in Eanana Gardens.

P. C. (Mount Pelion)—The Agricultural Chemist, Mr. J. C. Brünnich, advises:—

Dissolve 4 lb. of grey arsenic with the aid of 2 lb. of caustic soda in a kerosene tin in a few gallons of water and make up to 100 gallons for spraying. The mixture will only kill succulent weeds.

### Bone Crushing.

H.N.R. (Woombye)—Your inquiry regarding the crushing of bones without a mill was referred to the Agricultural Chemist, Mr. J. C. Brünnich, who advises:—

- (a) Pack bones layer by layer, with fresh wood ashes, in a barrel, and keep moist with water for several months.
- (b) Boil bones in copper or iron boiler with caustic lye for two to three hours; 15 parts of bones, 5 parts of caustic soda dissolved in 15 parts of water. Bones can also be left to stand in lye liquor for a few weeks.
- (c) Mix bones in heaps with quicklime. Make a layer of loamy soil 4 inches deep, followed by a layer of bones 6 inches deep, and covered with a layer of quicklime (not slaked lime) 3 inches deep. Then layers of loam, bones, and quicklime until convenient height is reached and the whole is covered by a thick layer of soil. Holes are bored in this top layer of earth and water poured in, and the whole left for three or four months.

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### BOTANY.

The following replies have been selected from the outgoing mail of the Government Botanist, Mr. Cyril White, F.L.S.:—

### Tea Trees.

INQUIRER (Brisbane)—

Neither specimen sent represents *Melaleuca Irbyana*. It is rather a difficult matter to name Tea Trees from leaves only, but we should say that the big tree is *Melaleuca bracteata* (the River Tea Tree) and the shrub, *Baeckea virgata*.

### Plants from Yarraman Identified.

INQUIRER (Brisbane)—The specimens from Yarraman have been determined as follows:—

M.A.R.

108. *Exocarpus latifolius*. Broad-leaved Cherry.
109. *Solanum discolor*. Devil's Needles.
110. *Dendrobium teretifolium*. Pencil Orchid.
111. *Dendrobium gracilicaule*.
112. *Brachychiton populneum*. (Syn. *Sterculia diversifolia*)—Kurrajong.
113. *Dodonaea cuneata*. A "Hop Bush."
114. *Cupania Xylocarpa*. A "Foam Bark."
115. *Duboisia Leichhardtii*. An interesting species intermediate between the Pituri (*D. Hopwoodii*) and Corkwood (*D. myoporoides*).
116. *Turraea pubescens*.
117. *Cleistanthus Cunninghamii*.
118. *Tarrietia Arggyrodendron*. Booyong.
119. *Nephelium tomentosum*.
120. *Canthium vacciniifolium*.
121. *Marlea vitiensis*.
122. *Cupania anacardioides* var. *parvifolia*: Sometimes called "Tamaran," but I do not know the origin of the vernacular; perhaps it is a corruption of "Tamarind."

**Yellow Pea (*Cassia notabilis*).**

INQUIRER (Brisbane)—

The specimen is *Cassia notabilis*, a species of "Yellow Pea" or "Wild Senna." It is apparently not very common in Queensland, as we have only previously received one specimen, collected many years ago by E. J. Whelan on sand ridges near the Georgina River. Its properties are not known, but the genus is widely spread over the warmer regions of the world, and a number occur in Queensland, some of them bad weeds. Most are more or less purgative, and "senna leaves" of commerce are the product of several species.

**Dogwood—Snake Weed—Rush Lily—Bitter Bark.**

G.P. (Rockhampton)—Your specimens have been determined as follows:—

No. 1. *Jacksonia scoparia*. Dogwood.No. 2. *Stachytarpheta dichotoma*. Snake Weed. A malformed specimen of a plant very common as a weed about Rockhampton. The malformation is probably due to insect attack.No. 3. *Xerotes multiflora*. Rush Lily. Rather an anomalous member of the lily family (Liliaceæ).No. 4. *Alstonia constricta* var. *mollis*. Commonly known as Native Cinchona, Quinine, or Bitter Bark; see leaflet enclosed herewith dealing with the plant.**The Tea Plant.**

H.H. (Brisbane)—

The specimen forwarded from Barrine, North Queensland, is *Camellia Thea*, the tea plant. An odd bush or so of commercial tea is to be seen growing here and there in Queensland. There are, however, a good many cultivated varieties, and what the particular one sent is we cannot say. We have not tasted tea from Queensland-grown bushes.

***Sida corrugata*—"Bindey-eye"—Cochineal Infested Pear.**

J.R.B. (Roma)—The specimens were very much eaten, but seemed to represent only two species:—

*Sida corrugata*, a common weed of the mallow family, eaten freely by stock, and quite wholesome; and*Bassia quinquecuspis*, a species of "bindey-eye," rather indigestible, but otherwise harmless.

Cochineal infested pear is not known at present to be poisonous.

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**SHEEP AND WOOL.**

*Selected from the outgoing mail of the Assistant Instructor in Sheep and Wool, Mr. J. Carew:—*

**Sheep Fattening.**

G.A.P. (Sandgate)—

For grazing purposes the most suitable crop to grow for fattening purposes generally is lucerne, as it gives a longer grazing period than any other crop, but is rather particular regarding soil. The decomposed granite soil is not well adapted for its growth as compared with heavier loams. Rape and mustard make an excellent fattening crop for sheep, but is only suitable for winter and spring feeding, this with panicum (white) or sudan grass for summer and autumn grazing should be very successful. Wheat and field peas, oats, and barley are also useful. An addition of a few ounces of whole maize per sheep per day with any of the above will be found very beneficial. Giving those sheep to be fattened free access to the crops is the most economic method of fattening. Mr. Brünnich's pamphlet on Stock Foods forwarded.



**PIG RAISING.**

*Selected from the outgoing mail of the Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.:—*

**Castration Risks.**

E.A.H. (Guluguba)—

The death of the young pig was probably due to complications resultant upon castration; blood poisoning was apparent by the immediate cause, this possibly being due to the use of an unclean knife or to the open wounds becoming infected from the soil in the yard. Deaths of young pigs following castration are also sometimes due to loss of blood, weakening the animal to such an extent that recovery is impossible. Then again, sometimes through the pig being very ill and indisposed to move about and the bowels becoming clogged. It is not, of course, impossible for a castrated pig to become infected with the bacillus of Tetanus. If the bacillus of this disease found entrance through the open wounds, death would probably rapidly ensue.

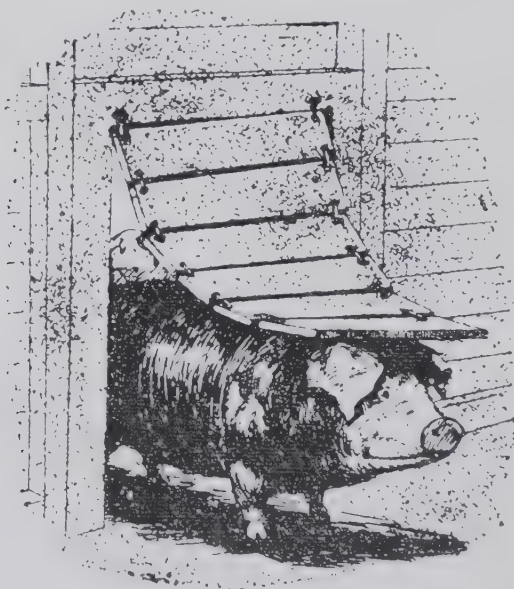
**Paralysis in Pigs.**

F.W.R. (Kingaroy)—

Tick paralysis in young pigs may be caused by the young pigs becoming infested with bush ticks. Of course, young pigs that suffer from severe diarrhoea or white scour are often very stiff and practically paralysed as a result of weakness of the hindquarter. Where pigs (particularly young pigs) are suffering from constipation, there will also often show indications of paralysis. Young pigs also sometimes suffer from a form of rickets and from heat apoplexy, of which partial paralysis are characteristic symptoms; the former, the result of lack of mineral matters and vitamins in the food, the latter the result of exposure. It is very difficult to definitely diagnose without inspection. Provide ample drinking water and green food, also charcoal, wood ashes, lime water, bonemeal, &c., as all these are valuable yet inexpensive additions to the pig's diet.

**SECTIONAL SWINGING DOOR.**

A sectional hanging door for the pig sty, as shown in the drawing, will keep fowls out but will not hinder the pigs. Cut a 6-inch board in lengths equal to the width of



the door. Two holes are drilled in the ends of each board so that they can be wired together and the assembly hung in the doorway as shown.—“Popular Mechanics.”

## General Notes.

### Hail Insurance.

The Regulations providing for the Hail Insurance Scheme under the Wheat Pool Acts have been amended.

### Staff Changes and Appointments.

The appointment of Mr. E. J. Lorraine as Inspector under the Diseases in Plants Acts, Brisbane, has been confirmed as from 4th March, 1927.

Mr. W. A. R. Cowdry, Cadet Grader, Cotton Section, has been appointed Assistant Cotton Grader (Junior), Department of Agriculture and Stock.

Constable D. Dwyer, South Kolan, has been appointed Inspector of Slaughter-houses.

The following have been appointed Officers under and for the purposes of the Animals and Birds Acts:—Mr. M. Harland, Upper Cedar Creek, via Samford; Mr. C. F. Driver, Brisbane; Mr. N. James, Upper Cedar Creek, via Samford; Miss E. B. Bowton and Mr. F. K. Bowton, Inveragh, North Coast Line; and Mr. M. E. Joyce, Townsville.

The resignation of Mr. Jas. Hutton as Member of the Egg Board has been accepted as from 30th September, 1927.

It has been approved that Mr. L. P. Doyle, Inspector of Stock, Cooyar, be transferred to Cloncurry, and that Mr. D. Culhane, Inspector of Stock, Ravensbourne, be transferred to Cooyar.

Mr. J. C. Pryde has been appointed Temporary Inspector of Slaughter-houses, Toowoomba, as from 5th October to 16th November, 1927.

Constable R. Hamill, of Stanthorpe, has been appointed Inspector of Slaughter-houses.

Mr. J. D. Irving has been appointed Cane Growers' Representative on the Tully Local Sugar Cane Prices Board, vice Mr. F. H. Gilmore, resigned.

The appointment of Officer in Charge, Police, Evergreen, as Acting Inspector of Stock, has been cancelled, and the Officer in Charge, Police, Peranga, has been appointed Acting Inspector of Stock.

### Egg Board Election.

Mr. A. H. Jones, Returning Officer, Department of Agriculture, advises that nominations will be received by him for the Egg Board Election, care Department of Agriculture and Stock, Brisbane, until the 24th November, 1927, for election for one year from the 1st January, 1928, as Growers' Representatives on the Egg Board. Five such representatives are to be elected by growers as defined in the Order in Council of the 14th January, 1926, appearing in the "Government Gazette" of the 16th January, 1926. Each nomination is to be signed by at least ten growers of eggs.

The following districts shall return one representative:—

No. 1 District.—The Petty Sessions Districts of Bundaberg, Gin Gin, Mount Perry, Eidsvold, Childers, Maryborough, Biggenden, Gayndah, Tinana, Gympie, Kilkivan, Wienholt, Nanango, Maroochy, Caboolture, Woodford, and Kileoy.

No. 2 District.—The Petty Sessions Districts of Redcliffe, and that portion of Brisbane north of the Brisbane River.

No. 3 District.—The Petty Sessions Districts of Wynnum, Cleveland, and that portion of Brisbane south of the Brisbane River.

No. 4 District.—The Petty Sessions Districts of Logan, Southport, Nerang, Beaudesert, Goodna, Ipswich, Lowood, Esk, Marburg, Harrisville, Dugandan, Rosewood, Laidley, Gatton, and Helidon.

No. 5 District.—The Petty Sessions Districts of Toowoomba, Clifton, Pittsworth, Allora, Warwick, Killarney, Inglewood, Texas, Goondiwindi, Stanthorpe, Highfields, Crow's Nest, Oakey, Goombungee, Cooyar, Jondaryan, Cecil Plains, and Dalby.

To ensure their names being on the roll, persons owning fifty or more domesticated fowls are invited to send their names for inclusion on the roll of persons eligible to vote.

The election, if any, will be held on the Thirty-first day of December, 1927.



### North Queensland a White Man's Land.

Thus a Victorian settler on the Atherton Tableland, writing to a friend in his home State:—"The climate here is a revelation to me. There is nothing better in the world. The altitude makes it an ideal white man's country. . . . I have a grand lot of men working for me; never had better. They are long, loose fellows, splendid workers; a fine crowd personally, and easy to handle. They are nearly all Australian-born. I fear that in Victoria we look at Queensland with a lot of political bias."

### More Sanctuaries Proclaimed.

The following properties, &c., have been declared sanctuaries for animals and birds:—

- (1) Timber Reserve (R. 6), and portion 47, parish of Eungella (property of D. A. Parker), on the western fall of the Eungella Range, Mackay.
- (2) Reserve for Scenic Purposes, No. 85, Cania Gorge, Gayndah.
- (3) Grounds of St. Faith's School, Yeppoon.
- (4) Properties of Dr. A. J. Marks, Mr. M. Harland, Messrs. C. F. Driver, N. James, and Mrs. E. R. Prentice, and Miss M. A. Burley, Upper Cedar Creek, via Samford.

### Central Sugar Cane Prices Board.

The following nominations have been received for the position of Canegrowers' Representative on the Central Sugar Cane Prices Board:—

P. J. Hoccy,  
G. H. D. Plant,  
T. A. Powell.

A poll will take place on the 12th November. The sitting member is Mr. Powell, and the person elected will hold office for three years.

### Crate Packing of Bananas—A Correction.

Mr. William Leslie, Assistant Instructor in Fruit Culture, writes:—

Reference Note on Crate Packing of Bananas as in the October Journal—Under Plate 97 the descriptive matter reads in the third and fourth line—

"Four head-pieces  $\frac{5}{8}$  in. x  $\frac{2\frac{2}{7}}{17}$  in. x  $2\frac{1}{2}$  in.

Four head-pieces  $\frac{5}{8}$  in. x  $\frac{1\frac{2}{7}}{17}$  in. x  $2\frac{1}{2}$  in.,"

and under Plate 98—

"Eight head-pieces  $\frac{5}{8}$  in. x  $\frac{1\frac{2}{7}}{17}$  in. x  $2\frac{1}{2}$  in."

In the double case (Plate 97) the head-pieces should be from 22 to 27 inches and from 12 to 17 inches long respectively, and your copy reads as if these numbers meant fractions of an inch. Likewise in the single case (Plate 98) the head-pieces should be from 12 to 17 inches in length according to the dimensions of the bunch to be packed.

### Queensland Butter at Islington—Warwick Wins.

The Minister for Agriculture and Stock, Mr. W. Forgan Smith, informed the Press recently that he was highly pleased to read of the further success of a Queensland factory at the important Dairy Show at Islington, London. The competition was open to the whole of the Dominions, and exhibits were staged from New South Wales, Victoria, Queensland, South Australia, New Zealand, Canada, and South Africa. In all there were eighty-three entries in the class, won by Queensland. The Minister desired to congratulate the management of the Warwick Butter and Dairying Association on their success in gaining first prize honours in such a strong competition. The result provides further evidence, if such were necessary, of the high quality of Queensland butter, and to secure 97 out of a possible 100 points, indicates that in the opinion of the judge the manufacture and quality of the butter were almost perfection. These butters would be judged after a lapse of about two months from the time of the actual churning of the cream, and the points awarded testify to the splendid keeping quality of the butter.

The Minister mentioned that the Warwick Butter and Dairying Association recently re-erected their factory on modern lines, fitted with the latest and most up-to-date machinery, and its success shows the material advantages that accrue through the installation of appliances of the latest design in factory equipment.

### Bird and Animal Sanctuaries.

The following have been declared sanctuaries under and for the purposes of the Animals and Birds Acts:—Curtis Island, north of Gladstone; Pasturage Reserve (R. 129), Townsville.

### Rural Schools—Training Brains and Hands.

This is what a Southern paper, "The Farmer and Settler," had to say of the exhibit of the Queensland Rural Schools at the last Brisbane Show:—

"Visitors to the Queensland show could not help being impressed with the value of the teaching given at the rural schools. Twelve of these schools are now established in Queensland—at Beenleigh, Boonah, Clifton, Gayndah, Gordonvale, Home Hill, Imbil, Malanda, Marburg, Murgon, Nambour, and Stanthorpe—and, though expensive to equip, judging by the high standard of excellence of the work displayed this year, they are well worth the cost. The rural school is going to help the bush boy and girl to a new interest in life, to love the life on the land, and to use their hands and their brains to the fullest extent and for the best purposes. Specimens of work in metal, leather, wood, and chemistry—soil fertilisers, and so on—from the boys, and in cookery, dressmaking, and, indeed, all branches of domestic science from the girls formed one of the best collections at the show. A saddle, a model portable piggery, stockyard—gates and all complete—watering cans and every household utensil in tinware, ploughshares and chains, bookcases and chairs, even a bed, all the work of country boys. The same degree of good workmanship was shown in the girls' section, and a remarkably clever exhibit in the cookery section was a wedding cake that had been made by one of the country girls. Nearby were dishes of sweets, cheese straws, cakes, pickles, and jams. Dressmaking and needlework were of the highest standard, and in consequence it may be safely considered that bush girls are being taught at our rural schools along the right lines to be the mothers of Australia of to-morrow."

### 4QG and the Farmer.

A commendable feature of the services provided by 4QG is the consideration given to people resident outside the metropolis. Too often city dwellers are prone to forget that outside the city environs there are thousands of men and women engaged in agricultural pursuits upon which the prosperity of our State largely depends.

Isolation from the big centres of population is a severe handicap to those who reside in the great open spaces, and no effort should be spared to make their conditions as bright and comfortable as possible. Now and again a listener-in writes 4QG complaining about the time taken up in the broadcasting of market and weather reports, news items, and agricultural lecturettes, but, fortunately, the big majority of city listeners realise the importance of such services to the man on the land.

The policy of 4QG is to cater for all sections of the community. City folk must not forget that whilst they are (in most cases, at any rate) in receipt of an assured income, the income of the man on the land is governed by the rise and fall of markets, weather, &c.

It is for these reasons that 4QG employs a specially qualified officer, Mr. Robt. Wight ("Market Reports"), to attend agricultural sales, collect market data, arrange agricultural lecturettes, and generally, look after the welfare of the country listener.

### Fur Farming in Canada.

Even in the early days of the fur trade in Canada it was the practice for trappers to keep foxes caught in warm weather alive until the fur was prime; from this practice has arisen the modern industry of fur farming. The industry is devoted chiefly to the raising of the silver fox, a colour phase of the common red fox established through experiments in breeding carried on by the pioneer fox farmers. There are now in Canada 2,130 fox farms with a total of 42,125 silver foxes, 1,736 patch or cross foxes, 1,196 red foxes, and 735 blue foxes. There are also 210 farms raising fur-bearing animals other than foxes, chief among which are mink, racoon, skunk, and muskrat. The value of fur-bearing animals on farms in 1925 was 9,898,019 dollars, the value of those sold off in that year being 2,897,270 dollars. In addition, the value of pelts sold from fur farms in 1925 was 781,383 dollars, this representing about 1 per cent. of the total value of the fur production of Canada in that year. The exports of furs from Canada in 1926 were valued at 17,017,507 dollars.



**Cheese Board.**

The Order in Council constituting the Cheese Board and published in the "Government Gazette" of the 16th July, 1927, has been amended by the insertion of a further paragraph, providing that all moneys due by factories for equalisation purposes shall be paid to the Cheese Board by agents of such factories.

**Amended Cheese Selling Rule.**

Rule No. 10 of the Cheese Selling Rules, published in the "Government Gazette" of the 19th February, 1927, has been amended. The Rule now provides for the maximum commission payable to agents for the sale of cheese, not to exceed 5 per cent. The maximum previously was  $4\frac{1}{2}$  per cent.

**Northern Pig Board.**

Nominations will be received by the Returning Officer, Northern Pig Board, care of the Department of Agriculture and Stock, Brisbane, until 5 p.m. on 21st November, 1927, for election for one year as growers' representatives on the Northern Pig Board.

Five such representatives are to be elected by those persons, who, at any time since the twenty-second day of June, 1927, kept pigs in any of the Petty Sessions Districts of Atherton, Herberton, Chillagoe, Cairns, Douglas, and Mourilyan.

Each nomination is to be signed by at least ten such growers.

If more than five nominations are received, a postal ballot will be taken.

The election (if any) will be held on the 23rd December, 1927.

**Milk as a Food.**

Milk is as near a perfect food as it is possible to obtain, as it contains all the essential elements for normal growth and development. We find it contains the materials necessary to maintain the living tissues of the body, i.e., proteins, and enough of the fats, starches, sugars, and mineral substances to furnish energy and growth. Milk contains a substance whose nature is not yet fully understood, but whose presence in the diet has been demonstrated to affect body growth in animal or man to a remarkable degree. These substances are termed *vitamines*, growth determinants, or the unknown dietary factors.

Clean milk fulfils all of the requirements for an adequate food better than any other single foodstuff, and it is the food most needed on the plantation, and in a great many instances, the hardest to obtain. Infant mortality would be decreased, and a healthier lot of youth would result were more pure, fresh milk used as food, and not considered in the light of a somewhat rare beverage for the older children. Milk as a source of energy, or as fuel for the body, compares most favourably with other foods.

The energy value of a quart of milk is about equivalent to that of a pound of lean meat or of eight eggs. As a source of energy, "cereals"—such as wheat, oats, or barley preparations—are, however, cheaper generally than either milk, meat, or eggs, and therefore cereal and milk is the ideal combination of foods to furnish energy in childhood.

Of all foodstuffs, milk is the cheapest, and most abundant source of obtaining the essentials for bone formation and growth. Therefore, milk should form a large part of every child's diet. How often have we seen ignorant mothers bringing up infants on a diet of coffee or tea, to which was added a small amount of canned milk!

**WOULD NOT BE WITHOUT THE JOURNAL.**

*Thus a Bororen correspondent: " . . . The Journal is a publication I would not be without."*

## Swat That Fly.

*The Dairyman's Pest.*—Go into a milking shed on a very hot day in which cows are bailed up for milking, and notice the large number of flies annoying each animal, and see how that animal switches its tail, moves its feet and body in order to “keep the fly moving.” If you want contentment and milk something should be done to rid the cows of the fly pest.

Flies are a terrible torment at times and have much to do with the lessening of the milk-flow. The cows are so worried and kept so busy fighting the flies that they lose much of the time they should be feeding, and it is their semi-starved condition that largely causes the shrinkage in flesh and milk.

The following mixture has been found as effective as, and less expensive than, many of the fly remedies on the market:—1 gallon fish or seal oil or old grease of any kind; 1 pint kerosene; 2 ounces (4 tablespoonfuls) crude carbolic acid. Mix well together and apply with a cloth or spray to all parts except the udder. Always put it on after milking to avoid the strong odour getting into the milk. In dry weather one application a week is usually sufficient. If the cows are out in a heavy rain, it will be necessary to go over them again.

Another fly remedy is:—10 parts of lard, or other grease, to 1 pint of pine tar. Mix well and apply with a brush or cloth once or twice a week to the parts most attacked. This is splendid as a relief.

*The House Fly.*—The house fly has always been a troublesome nuisance, but it is looked upon as a very potent agent in spreading dangerous diseases.

Flies are such indiscriminating scavengers; in their migrations they visit everything both hidden and revealed. When we consider this, the thought of them walking over our food or taking a sail in the milk pitcher is far from pleasant, and when bacteriologists inform us the average fly carries around on its body one and a-quarter million germs, surely we should feel a just cause for alarm.

*How they Breed.*—Flies breed profusely in filth. They reproduce themselves in countless thousands in the open manure pile, in the dirty pig pen or yard, in places where the household slops are regularly deposited, in vegetable garbage, any place where there is decomposing material.

By storing the manure in a dark shed, or by spreading it on the fields, keeping cow and calf yards and pig yards, &c., as clean as possible, and by providing better sanitary conditions, the troublesome fly can be greatly reduced.

To sprinkle all possible breeding places with kerosene or cover with lime, every few days, is strongly recommended.

Dr. Howard, entomologist of the United States Department of Agriculture, has found that each female lays about 120 eggs, which hatch in eight hours, the larva period lasting five days and the pupa five days, making the total time needed for the development of a generation just ten days. A big fly has always been a big fly, and a little fly can never grow to be a big fly—and just as soon as they have emerged from the pupa stage they begin laying eggs. Under favourable conditions a single pair of flies are capable of breeding something like 74,473,197,060,800,000,000 of their kind in a single season. Thanks to the birds and other agencies, flies are kept somewhat in check.

*Our Deadly Enemy.*—It is almost impossible to keep flies out of the kitchen, milk-room, and cow-stable, but we can greatly lessen their entrance by having the windows and doors screened.

Do not feed the flies by leaving dirty dishes and cans about the premises. Wash the milk-room floor clean.

We must learn to regard them as one of our most deadly enemies.

## Electric Lighting on the Farm.

Mr. Walter Tronson, a well-known Pomona dairy farmer, in the course of a very interesting letter to the “Live Stock Bulletin” (1st October), had this to say:—“By the way, I often wonder why more dairymen who run milking machines, and have engines, do not get a dynamo, so that they can have their houses lit with electric light. I have been lighting my place for years, and it never gives any trouble. I was speaking to the manager of a big electric light works the other day, and he said to me that any dairy farmer who had an engine could get a dynamo, all the wiring for seven or eight points, a suitable battery, everything complete, for £50. Why the dickens doesn't every dairyman light his house properly?”



### New Zealand to Can Butter.

According to the "Times" Trade and Engineering Supplement (London), a report from its correspondent at Vancouver states that "the unfortunate experience of New Zealand in regard to her price-controlled butter on the London market has apparently led exporting interests in the Dominion to make preparations for canning butter on a larger scale for the world's markets, and orders have just been placed with a company for 1,000,000 cans from the 1 lb. to 20 lb. capacity.

"These cans are to have three different designs, and hues to meet the different colour requirements in South America, the Orient, and the South Sea Islands."

### Essentials in Dairying.

There is always a definite starting point in attempting to achieve all things, and in reducing the cost of producing milk and its products the very first move must be that of taking an inventory of the whole situation as it now exists. That is the one way to find out what is wrong, and nothing can be righted until you know wherein it is now wrong.

Here are three fundamental facts (says the "Live Stock Journal") that must be grasped before the situation can be appreciated in the proper light:—

1. The dairy cow is a machine.
2. The dairy farm is a factory.
3. The dairy farmer is a manufacturer.

He who doubts these statements and does not conduct his operations accordingly will fail in ninety-nine cases out of a hundred. His only hope is that of luck.

On the other hand, when one who milks cows gets these three sentences marked indelibly on his mind and implanted in his heart, so that he recognises them as essential, vital facts, he soon realises that there is no business more worthy than dairy farming, no factory where good management is more necessary than on the farm, and no machine more responsive in converting raw material into finished commodities than are good dairy cows.

### The Royal Society of Queensland.

The ordinary monthly meeting was held in the Geology Lecture Theatre on Monday, 26th September, 1927.

The President, Professor E. J. Goddard was in the chair.

Messrs. A. M. Epps and L. Franzen were elected ordinary members of the Society.

Dr. E. O. Marks exhibited waterworn pebbles of igneous rock from the Mesozoic sandstone at Caloundra. Dr. Bryan and Mr. F. Bennett commented on the exhibit.

A paper on "Plants collected in the Mandated Territory of New Guinea by C. E. Lane-Poole," by Messrs. C. T. White and W. D. Francis was communicated by Mr. C. T. White. He laid on the table Mr. Lane-Poole's report on the Forest Resources of the Territories of Papua and New Guinea, published by the Commonwealth Government in 1925, which contained the narrative of the expedition and field notes on the specimens collected. Four species were described as new: *Sarauja emarginata* (Dilleniaceæ), *Eurya albiflora* (Ternstroemaceæ), *Mearnsia cordata* (Myrtaceæ), and *Hoya Poolei* (Asclepiadaceæ); and a number of new records were made of the distribution of known species.

Mr. A. K. Denmead, B.Sc., read a paper entitled "A Survey of the Brisbane Schists." This was an account of his investigations of the basal rocks between Tweed Heads and Rockhampton. He divided the rock formations into four series: (1) The greenstone series, largely in evidence near Petrie and Dayboro'; (2) the Bunya series, of micaphyllites, found in the area between Tweed Heads and Beenleigh, also at Coorparoo; (3) the Neranleigh series of greywackes, slates, &c., between Nerang and Beenleigh, and (4) the Fernvale series of jaspers, limestones, serpentines, &c. The trend of the rocks generally, he said, was from north-north-east to south-south-east. He advanced theories as to earth foldings and faults, and suggested that, in point of age, the lower beds were Silurian, passing through the Silurian into Devonian, and possibly through the Devonian into the Carboniferous. The paper was discussed by Dr. Bryan (who also communicated Professor Richards' comments), Drs. Whitehouse and Marks, Messrs. Tryon, Massey, and Bennett.

### Value of Orange Juice.

The great value of orange juice was pointed out in a paper read by Dr. Stanley Willmott at the British Pharmaceutical Conference, which recently sat at Brighton, England. "Of all citrus juices," he said "there is little doubt that that of the orange is the most valuable. It is, perhaps, the only food other than milk that can with safety be given to infants. New experiments have shown that orange juice has a much higher food value, or vitamin content, than was previously ever suspected." The chairman of the conference said the food value of oranges was remarkably high, and the use of pharmacists of the concentrated juice was a matter of importance.

### Shade Trees--Their Economic Value.

The treeless farm presents a very sorry spectacle, and one cannot fail to feel pity for the animals that are obliged to stand or lie in the broiling sun because of the absence of shade of any description.

It should be the aim of every farmer to surround his homestead with trees and to establish moderate-sized clumps in all the paddocks. Awkward corners can be utilised in no more profitable and pleasing manner than by planting them with trees.

In districts where timber for fencing and other purposes is scarce, all land that offers any difficulty in carrying on cultural operations should be planted. The investment, provided that the trees are accorded reasonable care and not interfered with by stock, will in the years to come return a very high rate of interest.

Apart from their economic and utilitarian value, trees, when judiciously arranged, add immensely to the attractiveness of a property and render it pleasingly distinctive, so that strangers in the district are immediately impressed.

### Dirty Fallows--Work for Summer.

Neglecting the fallow during the months of November and December is the chief cause of dirty fallows, and there is ample evidence that cultivations during those months have a more beneficial effect than in any other month of the fallow period. It is evident, too, that the more frequently the fallow is worked, provided of course it is done in the right manner, the better the chance of maximum yields. No better proof of the correctness of this statement is to be had than the results of the Central Western Championship Wheat Competition of last season, in which the winning crop—it obtained the highest points in all competitions in the State—was cultivated ten times between ploughing and sowing. Working the soil during the hot summer months is, of course, not recommended unless rain has destroyed the mulch, in which case it should be restored.

Perhaps the most frequent cause of harm to fallows is allowing weeds to grow to such a height that the disc-cultivator has to be employed, and to a depth ruinous to the compacted sub-surface soil. It is essential that all weeds should be destroyed when they are very small by shallow cultivation, preferably with the harrows.

The disc cultivator, regarded with such a friendly eye by most wheat-growers, is without doubt the best implement of all to put the fallow in bad condition. While admitting its value in destroying large weeds, it must be admitted that their destruction when small with other implements or sheep is nearly always possible, and that large weeds are the sign of neglected fallows. Deep discing ruins the compacted sub-surface layer, and delivers the clods to the bottom and fine soil to the surface, where it is easily crusted by the first rain. As discing usually takes place after harvest in January or February, not only is the whole physical condition of the fallows practically ruined, but rapid evaporation of moisture results, and there is not sufficient time to restore consolidation unless special means are devised, and they very rarely are.

It is in connection with the keeping down of weeds on the fallow that sheep are so valuable. They should undoubtedly be regarded as essential on every wheat farm; not only are they in themselves a profitable source of revenue, but they are a big factor in the production of an ideal fallow, not only by keeping down weed growth but also in assisting to produce a firm sub-surface area.

### THE JOURNAL CONTAINS A WEALTH OF INFORMATION.

*A Mulgeldie subscriber writes: "Enclosed please find renewal subscription for the Journal. Many thanks for past copies which have contained a wealth of information for the man on the land."*



### Production Costs in Terms of Time.

Interesting investigations were recently carried out by the Department of Agriculture, United States of America, with regard to the amount of labour expended in the production of various agricultural products which show that ordinarily tobacco requires more labour per acre than any other major crop grown in the United States. An acre of Burley tobacco yielding from 800 lb. to 1,000 lb. requires for growing, preparing for market, and marketing, from 350 to 400 hours of labour.

Cotton in the eastern cotton States requires from 100 to 125 hours of labour per acre where the yield of lint is from 150 lb. to 200 lb. On the other hand, in the western part of Texas, growers on farms yielding 140 lb. to 160 lb. of cotton per acre will normally expend only thirty-five to forty hours of labour per acre.

In producing an acre of potatoes from sixty-five to 100 hours of labour are normally used.

Labour requirements in corn production vary widely. In the Corn Belt, where large machines are used in large level fields, a bushel of corn can be produced with about 0.5 hour of labour, whereas in certain Southern States about 2.5 hours of labour are required for producing a bushel of corn.

Tobacco, cotton, sugar beets, potatoes, fruit, and truck crops absorb relatively large quantities of labour. Corn, the grain sorghums, and peanuts need less. Hay and small grain crops are usually produced with the least labour.

### Agricultural Education in the United States.

According to "The Journal of the Ministry of Agriculture," London, agricultural education in the United States of America during the past thirteen years has made remarkable progress through the development of the extension movement. This development dates from the introduction of the Smith-Lever Act in 1914, the keynote of which is co-operation. Prior to this Act, colleges were conducting considerable extension work with their own funds, and the Federal Department of Agriculture was spending, independently of the colleges, a further sum of 1,000,000 dollars. This work is now carried out by a single division, organised at the college, with a director at its head, appointed by the college with the assent of the Secretary of Agriculture. There is, further, co-operation between colleges in part of the extension work and in the plan for the voluntary pooling of all funds available for the various States.

In 1914 the State and Federal Governments were spending 1,600,000 dollars on extension work in agriculture and home economics, and, by 1924, this figure had increased to 19,394,639 dollars per annum, of which approximately 12,000,000 dollars were contributed by the States and counties.

In the same period, the total personnel increased from 1,230 to 4,764 officers, the latter figure including 765 full-time specialists, extension directors, and other supervisory officers.

In determining the policy of the extension work for a district, the farmers, with the agents of the co-operating county, State and Federal Governments, together review the local conditions and agree upon what ought to be done. The administration of the work is then entrusted to the State College of Agriculture. The full recognition of local people, conditions and practices, and the enlistment of the active participation of the individual farmer and his family in the planning and the carrying out of local extension work, are the two fundamental considerations to which the success is accredited. Demonstration farms, owned and operated by the Government, are being replaced by demonstration units owned and operated by the farmers under schemes developed jointly by the farmers and the Government agents. This partnership of the farmer with the Government, together with his work as a voluntary helper in the capacity of demonstrator, chairman or member of committee, has developed a sense of rural leadership, and given to the farmer a greater breadth of outlook, apart from the more direct benefit which accrues from the opportunity of improving his technical efficiency. The primary object of extension work, however, is the adoption of an improved practice, and there is evidence of a much wider use by farmers of lime, cover crops, green manures, fertilisers, seed of improved and standardised varieties, and of the improvement of orchards by renovation, pruning, and spraying.

Farmers are advised as to the formation of co-operative organisations for the disposal of their products and for the purchasing of their supplies, provided with general information on marketing problems, encouraged to adopt better business principles, and stimulated to keep and utilise farm records as a means of regulating their business.

### Concentrates—Price Not Always Index of Value.

In buying concentrates, it should be borne in mind that the market price of any particular feed is no indication of its value to the individual farmer. The value of any feed to the farmer depends largely on the nature and composition of the other feeds which he has at hand.—T. HAMILTON, in the "Rhodesia Agricultural Journal."

### Co-operative Development in the United States.

It is estimated that in 1900 there were approximately 2,000 farmers' business organisations functioning in the United States. Between 1900 and 1925 the number of active associations increased to about 12,000, and the purposes for which associations existed also increased.

At the close of 1925 there were approximately 12,000 functioning associations, including 40 federations, 80 centralised associations, 35 sales agencies, 50 bargaining associations, and nearly 10,000 independent local associations.

The number of associations marketing dairy products increased from 1,600 to 2,200; the number of associations handling grain from 100 to 3,400; the number of livestock shipping associations from less than 100 to 1,800; fruit and vegetable marketing associations from 100 to 1,300. There were also formed nearly 100 associations for marketing wool, and 70 marketing poultry and poultry product.

It is reasonable to assume that the business done in 1900 amounted to less than 200,000,000 dollars. This figure is significant in comparison with 2,400,000,000 dollars which is the estimated amount of business by farmers' associations in 1925. The 1900 figure is even more significant in the light of the fact that several of the present-day associations report sales of more than 50,000,000 dollars a year.—"News Bulletin" of the Markets and Migration Department (Federal).

### Seeking a Substitute for Petrol.

Speaking at the annual meeting of the Distillers' Company, Limited, in Edinburgh (Scotland) recently, the chairman (Mr. W. H. Ross), referring to the extension of the company's business overseas, said that it was conducting experiments in order to provide an alternative motor fuel. Although it had demonstrated beyond doubt the possibility of providing such a fuel, the company was met with two difficulties—(1) the improved position of petrol supply, which has enabled that commodity to be sold in England at a figure below the present cost of production of an alcohol fuel, and (2) the uncertainty of finding a raw material for producing such a fuel in England at a low enough price. In conjunction with international interests the company was now experimenting with a material that in time might supply the deficiency, but while continuing these experiments the company had also turned its attention to other parts of the Empire where the raw material could be obtained in considerable quantities at the minimum of cost. Such a field had been found in Northern Queensland, where, in conjunction with the local sugar planters and other Australian interests, and supported by the State Government as well as the Commonwealth Parliament, it had erected a moderately-sized distillery, which would be followed by others as soon as the first one had proved a success.

Mr. Ross acknowledged the valuable assistance the company had received at the hands of the Commonwealth and of the State Governments, which should go far to make this new industry a benefit both to Australia and to the company.

### An Effective Mouse Poison.

A poison that is proving highly satisfactory to farmers pestered by mice and sparrows is made of wheat coated with strychnine and milk. About 12 lb. of wheat (seconds are quite suitable) is first moistened with milk, and any surplus milk then drained off. One ounce of strychnine is next ground up and dusted on to the moistened wheat, which is mixed up by hand, and finally spread out on a bag to dry.

This poison is very strong, and a mouse has only to eat one grain to be destroyed. Another advantage is that this poisoned wheat may be kept for two years without losing its effectiveness. As soon as any mice are noticed the poison should be spread around and the mice will quickly disappear.

If the majority of farmers would adopt these preventive methods, mouse plagues would be quite unknown. If all haystacks were made mouse-proof with galvanised iron, the breeding grounds would be removed, and this combined with the use of poisoned wheat would stop a mouse plague at its very inception.

Now that farmers in our wheat districts are becoming more progressive and better organised, local bodies such as agricultural societies or branches of the Agricultural Bureau, who take a pride in local improvement, might organise co-operative movements to free their districts from the menace of future mouse plagues.—E. S. CLAYTON, Senior Experimentalist, in "Agricultural Gazette," New South Wales.



### Market Good Crops through Good Cows.

The aim of the dairyman should be to market a large portion of the crops grown on his farm through his cows, but it should be borne in mind that the kind of crops grown and the way they are fed has a lot to do with their ultimate value when marketed as dairy products. As far as possible the dairyman should avoid sending good crops to market through poor cows.—T. HAMILTON in the "Rhodesia Agricultural Journal."

### An Appeal for Thrift.

The seasons and the prices are not alone to blame for the shortness of money and the failure to make the farm pay. Those who know most about the economic conditions are outspoken in their appeal to farmers to exercise thrift. The same appeal may with equal force be made to all classes. In facing the prospect farmers will have to look more closely into those expenditures which are not necessary and which carry so many others in their train. A short period of intense thrift would be healthy for us all and do the country great service. Such a lessening of expenditures as could easily be made would help many a man to tide over his season and market difficulties. The only alternative is a lengthened procession of failures and a longer period of losses alike to farmers and to traders.—Waimate "Advertiser," (N.Z.).

### Encourage Home Manufactures.

If an individual policy is adopted of purchasing goods locally made wherever a choice is possible, the result will be increased confidence on the part of manufacturers, extensions of buildings and plants, the establishment of new industries, and a much larger demand for skilled labour. These, in turn, will add to the man-power of the country, will enlarge our resources, and so make the burden of taxation proportionately lighter. In building up our own national strength we are making our greatest and most valuable contribution to Imperial strength and unity.—Lyttleton "Times" (N.Z.).

### Land Values.

It would be the height of absurdity, realising the conditions that make farming unprofitable, to hesitate to adopt those measures which will give the industry a chance to make good. It is essential that confidence be restored, not only amongst farmers, but those who finance the farmers, and this can only be done by ruling definitely that land can have only one value, and that what it is capable of returning from production in average years. There can no longer be a taxing value, and a selling value from 150 to 200 per cent. above that on which taxation is paid. The settler must have his chance, and the system adopted must afford him not only protection against exploitation by speculators, but protection against any inclination on his own part to take serious risks.—"Southland News" (N.Z.).

### Do the Job Properly!

Competition from abroad will compel efficiency or drive inefficient industries out of existence. This was shown in a remarkable manner some years ago in the British boot industry, which plodded along in its old-fashioned way until American boots began to invade the British market. The British manufacturers did not, however, wait for a tariff to protect them; they overhauled their industry and made it so much more efficient that in a short time they were able to drive out the invaders and in their turn invade American territory. There are efficient industries which are prospering and not participating in the demand for higher protection, but there are others whose overhead expenses are so heavy that they cannot make a profit.—"Taranaki Herald" (N.Z.).

### Our Social Obligations.

"More and more we are realising that property can be justified only when it fulfils a function in society. The fortunate individual who draws huge royalties merely because he is lucky enough to own land which contains wealth; the middleman who produces nothing and who yet takes a big proportion of the profit; the man who lives on dividends and serves the community in no way to make up for the fact that he is not engaged in business: all of these ought to be taxed so heavily in comparison with the rest of the community that they will be tempted to serve a more useful purpose than merely to live upon the work of others."—From "The Permanent Value of the Ten Commandments," by H. J. Flowers, B.A., B.D.

**Fodder Sorghum.**

*After-cultivation and Harvesting of the Crop.*—In a recent issue of these notes attention was drawn to the value of the sweet (or fodder) sorghums, particularly to farmers in the drier parts of the State. Coastal dairy farmers have long ago realised the value of sorghum as supplying a highly nutritious and bulky fodder which is relished by all stock.

As particulars regarding sowing, manuring, and varieties were dealt with in the previous article, we will confine ourselves now to a consideration of after-cultivation and harvesting of the crop.

If the crop has been planted on the flat, the spaces between the rows should be lightly worked with a one-horse cultivator when the young plants are from 4 to 6 inches high. If the seed has been planted in furrows the first working of the ground should be carried out, when the young plants are 3 inches high, by lightly harrowing the area in the direction in which the drills run. This work kills a considerable amount of weed growth, and at the same time works some fine soil around the young plants. Another harrowing should be given when the plants reach the top of the drill, in order to finally level off the ground and check weed growth.

Frequent workings with the cultivator are necessary during the growth of the crop to keep down weeds and check evaporation of soil moisture. On large areas, a handy implement to use is a two-horse spring-tooth cultivator; this straddles the rows and covers a lot of ground in a day. This machine can be used until the crop is 3 or 4 feet in height; if subsequent workings are necessary, the single-horse machine has to be resorted to.

Shallow cultivation is necessary, as the sorghum roots come to within 3 or 4 inches of the surface of the ground.

*When and How to Harvest.*—Sorghum should not be fed to stock until it comes into head; if fed prior to this stage there is a danger of what is commonly known as sorghum poisoning. The greatest yield of green fodder is obtained when the seed has formed and is still in the milky stage; at this stage the material is very palatable and digestible.

Harvesting large areas for silage is generally carried out with a maize binder. This machine deals with a single row of crop at a time, and ties the material into bundles, thus facilitating handling in the field and at the silo chaff-cutter or silo stack. If the sorghum crop is not too high and bulky, and the stalks are fine, a reaper and binder will do effective work.

On small areas the crop is cut with sickles or hoes. A handy implement for cutting maize or sorghum stalks is a sledge with scythe blade attached; it is drawn by a single horse, and will cut a large amount of material in a day.

Sorghum intended for silage should be harvested when the grain is in the dough stage. Like all bulky fodders, it makes the best silage when chaffed, as it then packs well in the silo.

*Sorghum Poisoning.*—Cases of death have occurred frequently among cattle feeding upon sorghum. The deaths have been attributed by some to the presence of a poisonous substance in the plant, while others hold that they are caused by hoven, and that the crop is not more likely to cause death than any other green food. The suddenness of death, however, among stock after eating only small quantities of the plant is proof that some other factor than hoven is at work.

In feeding sorghum to stock it is only necessary to adopt certain precautions to avoid loss. The poisonous substance gradually diminishes as the plants get old, and entirely disappears by the time the seed is formed. Stock should not be allowed to eat young sorghum, especially if it is wilted through dry, hot weather. Stunted sorghum may also cause death, and immature sorghum which has been frosted is dangerous. The mature sorghum is harmless, and can be fed with perfect safety.—“A. and P. Notes,” N.S.W. Dept. Agr.

*PLEASED WITH THE JOURNAL.*

*A Warwick subscriber writes: “I received a copy of the ‘Agricultural Journal,’ also leaflets on poultry. I am very pleased with the valuable information on different subjects. I am enclosing order form for the Journal, which I consider no farmer should be without . . . .”*



### Beekeeping as a Farm Side Line.

Following are points of a paper on beekeeping on the farm read by a local farmer, Mr. A. J. Gregory, at a recent meeting of the Port Elliot branch of the South Australian Agricultural Bureau:—

Mr. A. J. Gregory said any farmer with a little knowledge of the subject could keep a few hives of bees without neglecting the more important work of the farm. To manage bees one required confidence, because the bees would detect nervousness, and drive the apiarist away every time he approached them. Bees should not be handled roughly, because that annoyed them. A smoker was the best thing to keep them in check. One should not go to the hive and puff smoke straight into the entrance; that had a tendency to drive the bees into the top part of the hive, and when the cover was removed one would find too many bees to drive down again, and they would become troublesome. The correct procedure was to go quietly to the hive, puff some smoke across the entrance once or twice, raise the cover sufficiently to puff some smoke across the top of the combs, put the cover down again for a few seconds, and then remove the cover. The smoke should be kept going across the top of the comb until the bees were all driven down, and then the combs should be removed for inspection. Those which were full of honey or contained sealed broods and honey should be extracted. On no account should unsealed ones be put through the extractor, or the hive of bees would be weakened, and if the honey flow continued would mean a loss, because hives which were not full of workers would not produce much honey. With regard to the position for standing hives, one should select a well-sheltered position, preferably facing an eastern slope. The hives should be placed at least 10 feet to 12 feet apart, with the entrance towards the east. They should not be placed too close to the homestead or a thoroughfare, or any part where other work had to be done, or trouble could be expected from the bees. Hives could be bought flat or intact, as well as frames, from any firm which stocked appliances. It was cheaper to buy the hives flat, so that they could be easily nailed together. Frames should be put together neatly, and fine wire used to hold the combs together. To fasten the foundation combs in the frames, one should cut a piece of board to fit inside the frame, place the foundation comb on the board, put the frame over that and press the wires into the comb, and fasten to the top of the frame with melted wax. In rearing queens, they should be selected from the best honey gatherers, and never from a poor gatherer. Drones also should not be reared in any but a hive of good gatherers. A few drone combs should be placed in the centre of the hive during the early spring. Speaking of methods of increase, the writer said if one had not time to watch the hives when swarming during spring time, the number of swarms could be increased by pasting them up, providing they were in double hives, and strong enough to make into fair swarms. One should remove the cover, and give the bees a thorough smoking, so that the queen and most of the bees were driven down to the lower part of the hive. The top part should then be removed and placed on a bottom board, a cover put on each, and the bottom part removed to another part of the apiary, leaving the top part in its original place. Both parts should be inspected after about five days in order to ascertain the swarm with the queen. If she had been left in the top part the places should be changed again, or most of the bees would return to the old position after a few days. After eight days the hives should be inspected in order to see which hive had no queen, and then all the queen cells except one should be removed. Only one queen cell should be left. If more than one was left the bees would swarm as soon as one queen was hatched. They should be allowed to swarm naturally and if one had the time it was best to hive them. In any case, if possible, they should not be permitted to send out more than one swarm each. The old hive should be examined five or six days after the swarm had left, and all the queen cells except one removed; otherwise they would have too many young queens ready to send off other swarms. That was the time to select queens from the best honey gatherers. The queen cell should be placed into a hive which was not producing good supplies of honey, and, at the same time, all the queen cells from the poor hives should be removed and destroyed. If the hives were not very strong, or there was not sufficient working bees available when good honey flowers were about or coming on, a good plan was to put a weaker hive alongside of them for a few days, and then move them to another part of the apiary. Similarly, if one had too many bees or too strong, they should be changed with a weaker one. That should only be done when good honey flower was in bloom. The writer concluded by saying that quality was more to be desired than quantity; thirty well-cared-for and well-worked hives of bees would gather as much honey, or perhaps more, than 100 hives in a weak state and badly managed.

### Varieties for Cross-Pollination.

Varieties planted for cross-pollination must have an affinity for each other; that is, the pollen of one must be acceptable to the pistils of the other, and such as will give the heaviest yields of good fruit. Both must be good pollen producers. If one is a shy bearer, and the other blooms in abundance, the variety producing little pollen will, of course, be greatly benefited, but there will be little reciprocal action.—J. M. WARD, in the "Journal of Agriculture" of Victoria.

### The Reserve Power of the Horse.

Horses have the advantage of being immediately adaptable to all conditions; they can be used on wet, soft, and boggy country, and then proceed along a macadamised road. The flexibility of the horse is marvellous, and in this he has a distinct advantage over the motor. For short distances the horse can develop a power several times as great as its normal working power. For this reason he can pull through clay bogs, climb steep hills, and successfully deal with all sorts of emergencies. On the farm the horse looks after its own repairs and renewals—the cost of which to the owner is infinitesimal.—J. F. McEACHRAN, M.R.C.V.S., in "Agricultural Gazette," N.S.W.

### The Constitution of the Dairy Cow.

To stand up to the strain of heavy dairy production a strong, robust constitution is one of the essentials needed. Much of the dairy cow's time in daylight when she might otherwise be feeding is taken up in and about the bails or yards and travelling backwards and forwards to the pastures, and as compared with fattening stock she is under a big disadvantage in this respect. Then, again, when in times of severe drought the feed is dried off by the great heat and practically disappears, the heavy-milking cow will, for a time, draw on her reserve forces to supply milk, to the certain detriment of her constitution.—J. T. COLE, at a recent Animal Husbandry Conference (N.S.W.).

### Practical Co-operation.

Batlow (New South Wales) fruitgrowers commenced co-operative operations in 1923 by establishing cool stores with 8,000-case space capacity. In 1924 they increased their stores to 14,000 cases, and, in addition, formed a co-operative packing-house company, and provided and operated the most up-to-date and efficient packing conveniences and plant. In 1926 the success of the existing cool stores demanded increased accommodation, and the stores were again enlarged to provide 24,000-case space. Not satisfied with trebling their undertaking in the first four years of their operations, the society is at present engaged in duplicating their stores, and will have from 45,000 to 50,000-case space available to handle the 1928 apple and pear harvest. As the stores are filled twice in the normal year, Batlow will be able to store upwards of 100,000 cases next harvest.

The cool stores and packing-house have enabled the growers to exercise a control over their marketing, and in this connection their Sydney selling depôt and their direct country sales have been mutually beneficial to the producer and the consumer.

There are only thirty-six members of the cool stores and twenty-four of the packing-shed. The capital costs are: Cool stores, £14,000; packing-shed, £3,500, making a total capital outlay of £17,500, of which £11,705 has now been actually provided by the growers. Of this £11,705, calls on shares have provided £5,785, and retention and loan levies £5,920. To provide for the 1927-28 extension of the cool stores, this latter sum is being capitalised in the form of shares paid up to 5s., which are being issued to existing shareholders in proportion to their individual retention and loan levy credits. It is of interest to note that the loan levies—which in the case of the packing-house amount to 3d. per packed bushel case on all fruit handled for shareholders, and with the cool stores to 6d. per case space per annum—both charges representing comparatively small deductions—have provided the means whereby the latest extension work is being financed.

The new work is estimated to cost £11,500, the whole of which amount will be advanced by the Rural Bank, the company having made arrangements by a system of case-levy to repay the whole within ten years. It is interesting to realise that the capital expenditure for the thirty-six people involved is £29,000, and that they are prepared, in view of their experience, to go on and on with the steps that will give them what all secondary producers require to get—the control of their produce.—C. C. CRANE, Agricultural Bureau Organiser, in "Agricultural Gazette," New South Wales.



### Improvement of Dairy Cattle in Irish Free State.

According to the Department of Agriculture there has been a most gratifying expansion of the measures for the improvement of dairy cattle in the Irish Free State. The number of Cow Testing Associations has been increased from 154 to 208, and the number of cows under test from 26,000 to nearly 54,000. It is estimated that approximately 230 associations will be recognised for the year 1927, representing an increase of over 42 per cent., as compared with 1923. Coincident with this progress in the grading up of non-pedigree dairy cattle there has been a correspondingly satisfactory increase in the number of pedigree dairy cows brought under test and in the number of new pedigree herds established. The latter developments have been largely assisted by the provision by the Department of an increased number of high-class stock bulls at approximately half cost for the use Cow Testing Associations, and by the leasing of such animals at a nominal fee to owners of small pedigree herds, who would not otherwise be in a position to purchase suitable animals for service purposes.

### Silage as an Insurance.

Under the triple heading—"More about Ensilage—A Great Insurance Policy—Costs 3s. 6d. per ton, now worth £5"—the "Quirindi Advocate" (N.S.W.) published a letter dated 19th July, 1927, from Mr. Tom Scott, of Scott Brothers "Aberfeldie," Currabubula, from which we extract the following:—

"As you know, we had a wonderful winter last year, and all sorts of rubbish grew in abundance. We had an old cultivation paddock, which grew a wonderful crop of wild oats, being in places 6 feet high. This we decided to put into pits as the only way of getting rid of them. It seemed a big undertaking to handle 400 tons of green stuff, but it turned out much easier than we expected. The first thing we did was to get in touch with Mr. M. H. Reynolds, who came along and gave all the necessary information on ensilage making, and watched it right through. The cost was an eye-opener to me. I expected it to be big, but on working it out I was surprised to find that 3s. 6d. per ton covered it—digging the pits included. To-day its value is about £5 per ton. We have been feeding sheep, cattle, and horses on it for about six weeks, and they seem to be doing all right. The cows are milking well, lambing ewes are in good order, and the lambs are good."

### Green Feed Values.

Fresh green roughages and succulents in general have a low protein content, owing chiefly to the relatively large amounts of water they contain. It should be remembered, however, that succulent feeds have a value not indicated by chemical analysis. These feeds are palatable, laxative, easily digested, and stimulate milk production.—T. HAMILTON, in the "Rhodesia Agricultural Journal."

### Marketing School for Farmers.

A school and institute of co-operative marketing, under the sponsorship of the Connecticut Agricultural College, the Department of Agriculture, and the co-operative associations of Connecticut, was held at Storrs, Connecticut, 16th to 19th August, the Department of Agriculture of United States of America has just announced. The purposes of the Institute, the Department says, in a written statement, are—"First, to make it possible for the men who now bear the responsibility for control and guidance of co-operative marketing in the various localities of New England to profit by each other's experience and methods and to study co-operation under the instruction of men of national reputation in the field; second, to bring some of the most promising and able of the younger farmers of New England into contact with these teachers and with the present leaders of co-operation in order that they may be prepared to take up the burden of responsibility when their time comes."

### "VERY MUCH APPRECIATED."

*Thus a Collinsville farmer, when writing to renew his subscription to the Journal: "The information in this Journal is quite inviting and very much appreciated."*

# The Home and the Garden.

## THE COOKING OF MEATS.

Miss M. A. WYLIE, Inspectress and Organiser Domestic Science,  
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### FRYING.

A large variety of dishes may be cooked by frying, and, when well done, this is a very satisfactory means of cooking small pieces of meat, fish, batters, and potatoes. When speed is necessary, it is a convenient method, as by it the fibre of food is quickly softened and cooked. A knowledge of a few scientific facts, however, is essential to success. Unless this knowledge is put into practice, failure is inevitable and an indigestible product results.

Frying is boiling in hot fat. Fat is formed of fatty acids and glycerine, the acids varying in the different fats and oils, e.g., the acid of tallow is stearic acid, that of olive and other oils is oleic acid. A simple classification of fats is as follows:—Animal fats: tallow, lard, suet; vegetable fats: olive oil, palm and cocoanut oil, and linseed oil; fish oils. For frying, the fat should be clarified, that is, it should be sweet, clean, fresh, and free from salt. If stale, the acid predominates, making it rancid, though the staleness is only due to foreign matter. Salt fat, when used, prevents proper browning. Dripping, skimmings from stock, oil, lard or butter may be rendered fit for cooking. Lard does not give as good a result as beef or mutton dripping, as it so often leaves a coating of fat on the surface of the food. When butter is used, a slow fire is necessary, as it is a substance that heats and burns quickly. Very often, olive oil is used, as many consider it the best of fats for frying. It, also, heats rapidly and therefore requires a slow fire.

Common fats remain solid at the ordinary temperature of air, but melt at about 160 deg. Fahr., and boil at 350 deg. to 450 deg. Fahr. When boiling, fat ceases to sizzle and bubble, becoming still with a slight blue fume—not smoke—rising from it. It is the presence of water in fat which causes the bubbling. Water boils at 212 deg. Fahr. . . . Therefore when the bubbles occur it is merely the water content boiling. When this is evaporated the temperature of the fat rises to its boiling point (350 deg. to 450 deg. Fahr.).

There are two methods of frying: shallow (often called English frying), and deep, or French frying. Chops, steak, pancakes, liver, eggs, and omelettes may be cooked by the first method; rissoles, fishcakes, doughnuts, potato chips, fish, apple fritters and similar dishes require the second method.

#### *General Directions for Shallow Frying.*

1. Place in pan sufficient fat to keep substance from adhering.
2. Heat fat till blue fume rises and surface is still.
3. Lightly and quickly brown substance evenly on both sides (e.g., chops and steaks) to harden surface albumen and so prevent escape of juices.
4. Then cook slowly ten to twelve minutes, turning with a knife.
5. Serve very hot.

#### *Deep Frying—General Directions.*

1. Prepare saucepan half full of fat (1 to 2 lb.), or enough to cover substance to be fried.
2. Heat till blue fume rises and surface is still.
3. Immerse substance, lowering it gently into the fat.
4. Cook till a golden brown; generally requires 3 to 5 minutes.
5. Drain on crumpled kitchen paper.
6. Serve on paper d'oyley on hot dish. Garnish neatly.
7. Remove fat from fire immediately, strain to be ready for further use.

Food cooked in this way should be protected by means of a covering of egg and bread crumbs, flour, batter, or oatmeal.

Of the two methods, deep frying is easily the more economical, since, though it requires more fat at the time, this can be strained and used again and again. As well, time is saved, as most foods only take three or four minutes to cook thoroughly when treated in this way.

In yet another way deep frying has the advantage over shallow, for, in this latter method, the large amount of water which is contained in the food quickly reduces the temperature of the small amount of fat, causing a semi-steaming and

\* In the "Journal of Agriculture," Western Australia.



boiling process to ensue. Thus the fat is liable to penetrate the food and form a coating round each fibre, rendering it difficult of digestion; whereas in deep frying the fat, by retaining its temperature (since the water in the food does not so materially affect the larger amount of fat), gives crispness to the productive covering which prevents penetration into the food by the fat.

### Recipes—Shallow Frying.

#### *Liver and Bacon.*

- 1 liver (calf's, lamb's, sheep or ox liver).
- $\frac{1}{4}$  to  $\frac{1}{2}$  lb. of fat bacon rashers.
- 1 tablespoonful of flour.
- Pepper, salt, dripping.

1. Cut liver into neat pieces,  $\frac{1}{2}$  in. thick.
2. Dip each piece into seasoned flour. This will help to keep in the red juices and prevent the fat from penetrating.
3. Cover bottom of frying pan with dripping (about  $\frac{1}{4}$  in. in depth when melted). Bring to boiling (fuming) point, then put in each piece of liver.
4. Fry 5 minutes on one side and 4 on the other.
5. Place in centre of a hot dish and serve with brown gravy and grilled or fried rolls of bacon. Garnish with finely chopped parsley.

*Note.*—Cut bacon in thin slices, remove rind. Roll up lightly and thread each roll on a skewer. This may be grilled over the fire or cooked in the oven while the liver is being fried.

#### *Fried Cutlets.*

- Cutlets.
- 1 egg.
- 8 tablespoons bread crumbs.
- $\frac{1}{2}$  teaspoon salt. Pepper.
- Dripping.

#### *Method.*

1. Trim cutlets, removing skin and gristle. Leave about 2 in. bare bone.
2. Beat egg on plate. Season.
3. Place bread crumbs on kitchen paper.
4. Dip cutlets into eggs and crumbs. Press each cutlet firmly with a knife and shake off loose crumbs.
5. Melt fat in pan and, when fuming hot, put in cutlets. Fry about 10 minutes.
6. Drain cutlets on kitchen paper.
7. Serve on mound or wall of mashed potatoes on hot dish with tomato sauce.

### Recipes—Deep Frying.

#### *Fish Cakes.*

- $\frac{1}{2}$  lb. of cold scraps of fish or tin of salmon.
- $\frac{1}{4}$  lb. to  $\frac{1}{2}$  lb. of cooked potatoes.
- 1 egg. Bread crumbs.
- 1 teaspoon chopped parsley.
- Salt and pepper.
- 2 tablespoons of milk or liquor from the fish.
- Dripping. Flour.

#### *Method.*

1. Remove bones and break fish up finely.
2. Mash and warm potatoes. Add to fish with parsley, pepper, salt. Mix well.
3. Beat egg. Add milk if necessary. Use part of this or liquor from fish to bind the mixture.
4. Divide into even pieces. Mould into shape, using very little flour.
5. Dip in egg and bread crumbs.
6. Fry in deep fat. Drain.
7. Serve on paper d'oyley. Garnish with lemon and parsley.

## THE KING'S "PLUM DUFF"—AN EMPIRE CHRISTMAS PUDDING.

The King's chef, Mr. Cédard, has supplied the Empire Marketing Board, so the Secretary of the Board (Mr. S. G. Tallents) informs us, with the following recipe for an Empire Christmas pudding:—

5 lb. of currants  
5 lb. of sultanas  
5 lb. of stoned raisins  
1½ lb. of minced apple  
5 lb. of bread crumbs  
5 lb. of beef suet  
2 lb. of cut candied peel  
2½ lb. of flour  
2½ lb. of sugar.  
20 eggs  
2 oz. ground cinnamon  
1½ oz. ground cloves  
1½ oz. ground nutmegs  
1 teaspoonful pudding spice  
1 gill brandy  
2 gills rum  
2 quarts old beer

For the ordinary family, quantities would, of course, be proportionately less. It is significant that all the ingredients are produced within the Empire and Australian fruits and other products will be used by the King's cook in the Christmas pudding for their Majesties' own table.

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## MANURING ROSES.

"I never put manure near a rose stalk. I make holes between (half way) the trees, about 12 to 18 in. deep, and the watering once a week is sufficient to carry the good of the manure which is buried in these holes to the trees."—E.F.B. in "South African Gardening."

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## BONEMEAL FOR THE LAWN.

"As the lawn is generally visible from the house windows, surface dressing in the spring is often neglected on account of the unsightly appearance that is almost unavoidable. Try dressing with bone meal, using 4 oz. to the square yard. It will greatly help in producing a deep green velvety lawn, without being noticeable when applied."—M.B. in "Popular Gardening."

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## THE MANURE HEAP.

Where farmyard manure has to be stored for a time, it should be carefully kept, in order to conserve the rich ingredients and prevent their draining away. The shape of the heap, of course, depends on the amount and the available space; any shape does, as long as something is placed on top to keep off heavy rains. Stack the manure on the north side of the garden, or at least shaded from too hot sunshine. See that the soil underneath is tramped or rolled firm, and when building the manure on this, spread it out evenly, mix it well, and beat it down firmly. If during the season it appears to get very dry, sprinkle a little water on it to keep it moist. A tub or barrel should be buried near the manure heap, and in such a place that all the liquid flows into it. Every manure heap slowly "sweats" or exudes a brown liquid, which is a very rich fertiliser, and should always be saved. When diluted, this liquid can be used freely.



## HOUSE ASHES.

House ashes or cinders should be saved and utilised in the garden. Where the garden is heavy or clayey, they can be spread on the surface and dug into the soil; they will then assist the process of disintegration, opening up the clay and helping at the same time to aerate and drain the ground. Fine, gritty house ashes spread round young plants will keep off slugs and prevent them from doing damage. The fine, dusty matter from the fire may be mixed with soot and used to dust the plants for insecticidal purposes. The large cinders should be used in the boiler fire. When planting bushes of any kind in the garden, mix a little lime with the larger cinders and place a good layer of these in the bottom of the trench. This facilitates drainage, preventing water from stagnating round the roots, and helps to keep pests from burrowing up amongst the roots of the bush. Clinkers, unless of the very finest, should not be used in the garden. The manurial value of cinder is practically nil.

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## THE CULTIVATION OF THE GERBERA.

Gerberas seem to like a moderately heavy soil best. Red volcanic soils suit them to perfection.

Good drainage is very important. A northerly slope is the ideal spot, open to all the sunlight, for Gerberas are true sun-worshippers. If you have not a northerly aspect, plant the Gerberas along the northern side of a paling fence or wall.

Thoroughly dig the soil to a depth of 18 inches; mix with it some well-decayed cow or horse manure, burnt grass or other vegetable matter; raise the beds slightly, say three or four inches, above the level of the path; tread down the soil firmly, and place your plants in position.

Narrow beds, with two rows of plants placed about 15 to 18 inches apart, will do nicely. After putting out your plants, just keep the soil moist; do not attempt to overdo the watering. Then, beyond pulling out the weeds, leave your plants almost entirely alone.

Purchase the best plants you can obtain. Seedlings, of course, have all their life before them, but you never know what colours you are likely to get. If they are small plants, they may turn out nearly all pale yellows or washy shades. Sections of vigorous plants which have flowered will give entire satisfaction if properly handled.

Do not forget to make the soil firm around the plants. Mulch the surface with rotted leaves or grass. You will then reap a harvest of beautiful flowers, which are not excelled for decorations, over a period of many months.

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## KITCHEN GARDEN.

Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered; otherwise the plants will leave off bearing. Seeds of all these may be sown for a succession. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Where there is an unlimited supply of water, and where shade can be provided, lettuce and other salad plants may still be sown. All vacant ground should be well manured and dug two spits deep. Manure and dig as the crops come off, and the land will be ready for use after the first shower.

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## FLOWER GARDEN.

Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked layer beneath the loose soil. Alternate light with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulacca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. These may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant them out at once in their new positions. Topdress all lawns.

## Orchard Notes for December.

### THE COASTAL DISTRICTS.

The planting of pineapples and bananas may be continued, taking care that the ground is properly prepared and suckers carefully selected, as advised previously in these Notes. Keep the plantations well worked and free from weeds of all kinds, especially if the season is dry. New plantations require constant attention, in order to give young plants every chance to get a good start; if checked when young they take a long time to pull up and the fruiting period is considerably retarded. Small areas well worked are more profitable than large areas indifferently looked after, as the fruit they produce is of very much better quality. This is a very important matter in the case of both of these fruits, as with the great increase in the area under crop there is not likely to be a profitable market for inferior fruit. Cannerymen only want first-class pines of a size that will fill a can, and cannot utilise small or inferior fruit, except in very limited quantities, and even then at a very low price. Small, badly filled bananas are always hard to quit, and with a well-supplied market they become unsaleable. Pineapple growers, especially those who have a quantity of the Ripley Queen variety, are warned that the sending of very immature fruit to the Southern markets is most unwise, as there is no surer way of spoiling the market for the main crop. Immature pineapples are not fit for human consumption, and should be condemned by the health authorities of the States to which they are sent.

Citrus orchards require constant attention; the land must be kept well worked and all weed growth destroyed. Spraying or cyaniding for scale insects should be carried out where necessary. Spraying with fungicides should be done where the trees show the need of it. A close lookout must be kept for the first indications of "maori," and as soon as it is discovered the trees should either be dusted with dry sulphur or sprayed with the lime-sulphur, potassium, or sodium sulphide washes. Borer should be looked for and destroyed whenever seen.

Early grapes will be ready for cutting. Handle carefully, and get them on to the market in the best possible condition. A bunch with the bloom on and every berry perfect will always look and sell well, even on a full market, when crushed and ill-packed lines are hard to quit.

Peaches, plums, papaws, and melons will be in season during the month. See that they are properly handled. Look out for fruit fly in all early ripening stone fruit, and see that none is left to lie under the trees to rot and thus breed a big crop of flies to destroy the mango crop when it ripens.

Keep leaf-eating insects of all kinds in check by spraying the plants on which they feed with arsenate of lead.

Look out for Irish blight in potatoes and tomatoes, and mildew on melons and kindred plants. Use Bordeaux or Burgundy mixture for the former, and finely ground sulphur or a sulphide spray for the latter.

### THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Early ripening apples, plums, apricots, peaches, and nectarines will be ready for marketing during the month. They are unsatisfactory lines to handle, as the old saw, "Early ripe, early rotten," applies to all of them; in fact, the season of any particular variety is so short that it must be marketed and consumed as quickly as possible. All early ripening deciduous fruits are poor carriers and bad keepers, as their flesh is soft and watery, deficient in firmness and sugar, and cannot, therefore, be sent to any distant market. The available markets are quickly over-supplied with this class of fruit, and a glut takes place in consequence. Merchants frequently make the serious mistake of trying to hold such fruits, in the hope of the market improving, with the result that, instead of improving, the market frequently becomes more and more congested, and held-over lines have to be sent to the tip. There is only one way to deal with this class of fruit, and that is to clear the markets daily, no matter what the price, and get it distributed and into consumption as rapidly as possible by means of barrowmen and hawkers. Most early ripening fruits are useless for preserving in any way, their only value being what they will bring for consumption whilst fresh. This being so, it is only a waste of time and money to forward immature, undersized, and inferior fruit to market, as it is not wanted, and there is



no sale for it. It should never have been grown, as it is frequently only an expense to the producer, besides which, unless the fallen or over-ripe fruit is regularly and systematically gathered and destroyed in the orchard, it becomes a breeding ground for fruit fly and codlin moth, as well as of fungi, such as those producing the brown and ripe rots. Early ripening fruits should, therefore, be carefully graded for size and quality, handled, and packed with great care, and nothing but choice fruit sent to market. If this is done, a good price will be secured, but if the whole crop—good, bad, and indifferent—is rushed on to the local markets, a serious congestion is bound to take place and large quantities will go to waste.

Orchards and vineyards must be kept in a state of perfect tilth, especially if the weather is dry, so as to retain the moisture necessary for the development of the later ripening fruits. Where citrus fruits are grown, an irrigation should be given during the month if water is available for this purpose, excepting, of course, there is a good fall of rain sufficient to provide an ample supply of moisture.

Codlin moth and fruit fly must receive constant attention and be kept under control, otherwise the later-ripening fruits are likely to suffer severely from the depredations of these serious pests.

Grape vines must be carefully attended to and sprayed where necessary for black spot or downy mildew, or sulphured for oidium. Where brown rot makes its appearance, spraying with the potassium or sodium sulphide washes should be carried out. Leaf-eating insects of all kinds can be kept in check by spraying with arsenate of lead.

Vegetables will require constant attention in the Granite Belt area. Tomatoes and potatoes will require to be carefully watched in order to prevent loss from Irish blight, and no time should be lost in spraying these crops should this disease make its appearance in any part of the district, as it can be prevented by spraying with either Bordeaux or Burgundy mixture. These fungicides effectually protect the plants to which they are applied if used in time. If leaf-eating insects, such as beetles, grasshoppers, and caterpillars, are doing damage as well, add 3 or 4 lb. of arsenate of lead to the 100 gallons of spraying mixture used for the prevention of early and late blight (potato macrosporium and Irish blight), so that the one application will be effectual for both classes of diseases.

Keep all kinds of vegetables well worked, stirring the land frequently to retain moisture, and taking care to prevent the formation of a surface crust should rain fall. Remember that vegetables require plenty of moisture; therefore leave nothing to chance, but do your best to retain all the moisture in the soil you possibly can.

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## Farm Notes for December.

Although November is regarded generally as the best period for planting the main maize crop, on account of the tasseling period harmonising later on with the summer rains, December planting may be carried out in districts where early frosts are not prevalent, provided a known quick maturing variety of maize is sown.

To ensure a supply of late autumn and winter feed, dairymen are advised to make successive sowings of maize and sorghums, to be ultimately used either as green feed or in the form of silage. The necessity for such provision cannot be too strongly urged. Farmers who have not had any experience in building an ensilage stack can rest assured that, if they produce a crop for this purpose, information and instruction on the matter will be given on application to the Under Secretary for Agriculture and Stock; also that, whenever possible, the services of an instructor will be made available for carrying out a demonstration in ensilage-making for the benefit of the farmer concerned and his immediate neighbours.

In districts and localities where supplies of lucerne are not available, sowings of cowpeas should be made, particularly by dairymen, as the lack of protein-yielding foods for milch cows is a common cause of diminished milk supplies and of unthriftiness of animals in dairy herds. Cowpeas and lucerne can be depended upon to supply the deficiency. The former crop is hardy and drought-resisting. When plants are to be used as fodder, it is customary to commence to feed them to stock when the pods have formed. Animals are not fond of cowpeas in a fresh, green state, consequently the plants should be cut a day or two before use. Economy is effected by chaffing beforehand, but the plants can also be fed whole. Chaffed in the manner

indicated, and fed in conjunction with green maize, or sorghum, when in head, in the proportion of one-third of the former to two-thirds of the latter, a well-balanced ration is obtainable. Animals with access to grass land will consume from 40 to 50 lb. per head per day; a good increase in the milk flow is promoted by this succulent diet. The plant has other excellent attributes as a soil renovator. Pig-raisers will find it invaluable also.

A great variety of quick-growing catch crops, suitable for green fodder and ensilage purposes, may also be sown this month, notably Sudan grass, white panicum, giant panicum (liberty millet), Japanese millet, red and white French millet. Well prepared land, however, is required for crops of this description, which make their growth within a very limited period of time. French millet is particularly valuable as a birdseed crop, the white variety being more in favour for this purpose.

Successive sowings may be made of pumpkins, melons, and plants of this description.

In districts where onions are grown, these will now be ready for harvesting. If attention is given, in the case of garden plots, to bending over the tops of the onions, maturity of the crop is hastened. Evidence will be shown of the natural ripening-off process, and steps should be taken to lift the bulbs and to place them in windows until the tops are dry enough to twist off. If a ready market is not available, and it is decided to hold over the onions for a time, special care should be taken in handling. Storage in racks in a cool barn is necessary; otherwise considerable deterioration is to be expected. Improved prices are to be looked for in marketing by grading and classifying produce of this description.

Cotton areas which were subjected to a thorough initial preparation, thereby conserving a sufficiency of moisture for the young plants, should now be making good headway and sending their taproots well down. Keep down all weed growth by scarifying as long as the growth will admit of horse work.

## Seed Maize for Sale

All previous lists are cancelled

To growers desirous of obtaining a pure and reliable strain of improved seed, the following variety is being offered, and represents a limited stock raised from selected strains of Departmental seed:—

### Improved Yellow Dent

#### Conditions of Sale

Applications for seed, with accompanying remittance (exchange added), should be addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane. Postal address and name of Railway Station should be given, also date seed should be sent from Brisbane.

Advice will be sent when seed is despatched.

Purchasers are requested to write promptly after receipt of seed, should any matters require adjustment.

#### Price

To enable applicants living at a distance to benefit, a flat rate of 11s. per bushel is being charged. This price includes all railage to the nearest railway station, but where steamer freight is necessary, this and any charges in relation thereto must be paid by the purchaser and the cost thereof added to the remittance.

#### Description

*Improved Yellow Dent.*—A tall-growing, late-maturing variety—five to five and a-half months. The ears are cylindrical in shape, carrying sixteen to eighteen tightly-packed rows. The grain is deep, wedge-shaped, of rich amber colour, with a yellow tip cap and rough crease dent. It is suitable for coastal districts and scrub lands where there is a good rainfall. It is capable of giving heavy yields of grain and fodder. Special strains of this seed have yielded over 100 bushels per acre under field conditions.

The other varieties previously advertised have all been disposed of.



ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

MOONRISE.

1927.	November.		December.		Nov.	Dec.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	5.3	6.9	4.50	6.32	a.m. 9.41	a.m. 10.31
2	5.2	6.10	4.50	6.32	10.37	11.34
3	5.1	6.11	4.50	6.33	11.37	p.m. 12.35
4	5.0	6.11	4.50	6.34	12.42	1.39
5	5.0	6.12	4.50	6.35	1.44	2.42
6	4.59	6.13	4.50	6.35	2.49	3.49
7	4.58	6.13	4.50	6.36	3.56	4.56
8	4.57	6.14	4.50	6.37	5.3	6.6
9	4.57	6.15	4.50	6.37	6.12	7.15
10	4.56	6.15	4.51	6.38	7.22	8.19
11	4.56	6.16	4.51	6.39	8.32	9.16
12	4.55	6.17	4.51	6.40	9.36	10.8
13	4.55	6.18	4.51	6.40	10.36	10.52
14	4.54	6.18	4.52	6.41	11.30	11.30
15	4.54	6.19	4.52	6.41	...	...
16	4.53	6.20	4.52	6.42	a.m. 12.17	a.m. 12.4
17	4.53	6.21	4.52	6.43	12.55	12.35
18	4.53	6.21	4.53	6.43	1.30	1.3
19	4.52	6.22	4.53	6.44	2.3	1.33
20	4.52	6.23	4.54	6.44	2.33	2.3
21	4.51	6.24	4.54	6.45	3.2	2.36
22	4.51	6.25	4.55	6.46	3.32	3.13
23	4.51	6.26	4.55	6.46	4.3	3.52
24	4.51	6.27	4.56	6.47	4.36	4.39
25	4.51	6.28	4.56	6.47	5.14	5.30
26	4.50	6.29	4.57	6.47	5.56	6.25
27	4.50	6.29	4.57	6.48	6.44	7.24
28	4.50	6.30	4.58	6.48	7.36	8.25
29	4.50	6.31	4.59	6.48	8.32	9.27
30	4.50	6.31	5.0	6.49	9.30	10.28
31	...	...	5.0	6.49	...	11.30

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

3 Nov. ☾ First Quarter 1 16 a.m.  
9 " ○ Full Moon 4 36 p.m.  
16 " ☾ Last Quarter 3 28 p.m.  
24 " ● New Moon 8 9 p.m.

Perigee 9th November, at 1 18 a.m.  
Apogee 21st November, at 4 54 p.m.

On the 3rd the occultation of Kappa Capricorni by the Moon will occur about 9.45 p.m. at Rockhampton and somewhat earlier at more northern places in Queensland.

It will be interesting to notice the nearness of Jupiter and the Moon late at night on the 5th, especially near the time of the Moon's setting.

Between 10.30 p.m. and 11 p.m. on the 10th Omega Tauri will be occulted by the Moon.

The inferior conjunction of Mercury with the Sun on the 10th will be of special interest on this occasion as the planet will make a transit of the Sun's face.

On the morning of the 21st, Venus will be at its greatest altitude above the eastern horizon, and at about 3 a.m. the crescent Moon, with its horns towards it, will help to form a pretty spectacle.

On the 25th, Mercury will be at its greatest western elongation and its greatest height above the eastern horizon before sunrise.

The Southern Cross will reach its lowest point, represented by VI. on the clock face, in its circle round the celestial pole before midnight during November, and will therefore be absent from the evening sky.

2 Dec. ☾ First Quarter 12 14 p.m.  
9 " ○ Full Moon 3 32 a.m.  
16 " ☾ Last Quarter 10 3 a.m.  
24 " ● New Moon 2 13 p.m.  
31 " ☾ First Quarter 9 22 p.m.

Perigee 7th December, at 7 11 a.m.  
Apogee 19th December, at 8 24 a.m.

The occultation of Psi Aquarii by the Moon will commence shortly before it rises on the 2nd, but its reappearance on the illuminated side of the Moon may be watched with telescope or binoculars at places as far east as Warwick, Toowoomba, Brisbane, &c., between 12.15 p.m. and 12.25 p.m.

Saturn will be in conjunction with the Sun on the 3rd, when it will be about 900 million of miles beyond the Sun and so nearly on a line with it as to be invisible. A week or two later it will be coming into view in the early morning, with some of the stars of Scorpio, about an hour before sunrise.

A total eclipse of the Moon will take place after midnight of the 8th December. It will first be observable about nine minutes to 2 a.m. on the 9th, when the Moon has passed the meridian and is descending towards the west. Totality will last from 2.54 a.m. to 4.14 a.m., but another hour will elapse before the Moon entirely emerges from the shadow of the earth, so that it will set while partially eclipsed at places on the eastern side of Australia after the Sun has risen.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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# QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXVIII.

1 DECEMBER, 1927.

PART 6.

## Event and Comment.

### The Wheat Yield Record Bushel Weights—Estimate Exceeded.

THE Minister for Agriculture and Stock (Mr. W. Forgan Smith), in the course of a recent press announcement, expressed satisfaction with the statement of the Wheat Board concerning the extraordinarily high bushel weight of the new season's wheat in course of daily delivery at the Board's numerous depôts, ranging as it does from 64 to 67 lb. per bushel straight from the harvesting machines, and constituting what appears to be a world's record in this respect. These results go to strengthen the principle so generally advocated by the Department that the wheatgrower who designs and bases his cultivation and other work on scientific lines must ultimately succeed. It augurs well for the future development of this State that improved agricultural practices are gradually tending towards increased production which modern civilisation now demands. This harvest's high bushel weight will be associated nearly everywhere with high yields, and the estimated return of a few weeks ago should be easily surpassed. These yields go to show the possibilities of the development of the State as a producer of wheat, and give promise that wheat growing might be engaged in successfully on a more extensive scale than at present, particularly in newer districts, such as the South-Western areas.

Last summer's rains were well up to the average, and where careful methods of cultivation were followed crop results were entirely satisfactory. Happily, the June rainfall was generous, fully 3 inches in most parts, and although the falls were light enough during the growing season of the wheat, rendering the outlook anything but promising in September, the October rains saved the situation, and the present magnificent crop is the result.

One has only to witness the activity displayed at the Wheat Board's receiving depôts to realise the advantages of the growers' own system of organised marketing. "It is gratifying to know," added the Minister, "that the growers generally and their representatives on the Board are alive to the advantages of co-operating with



the officers of the Department of Agriculture who are assisting to put the wheat-growing industry on a better footing. Wheats bred and carefully tested out by the several Field Officers of the Department are now well distributed throughout the Wheat Belt. Some of these come under the category of high bushel weight combined with yield. 'Watchman' wheat, grown in the Maranoa district, is a notable example with an official weight of 68 lb. to the bushel (against the standard of 60 lb. to the bushel). This variety is a production of the Roma State Farm, and it is significant also that the first crop harvested this year in the Allora district, 'Novo,' which yielded 40 bushels to the acre, also had its origin at the Roma State Farm.

"A record crop of 'Pusa' wheat, grown in the Pilton district the season before last, returned 46½ bushels per acre. It is not at all unlikely that even this extraordinary yield will be exceeded this harvest. It is interesting to note that about twenty years ago a few grains of this variety were obtained in an exchange from India, and after a series of trials extending over several years to test the adaptability of the variety to Queensland conditions, it was brought into general cultivation, and ranks as one of the most favoured varieties at the present time.

"The recent innovation in the way of a Wheat Crop Competition will promote a great deal of interest, and will focus a closer attention on the part of the growers to the essentials of wheatgrowing as a business. The fifty-one crops entered in the competition are reported upon by Mr. Quodling, Director of Agriculture, the judge of the competing wheats, as being generally of a very high standard."

### **Queensland at Work—A Picture of the Tropical North.**

"**N**OWHERE else can the same rural energy be seen—the fertile land oozing wealth, the busy farmers breaking in their fields and renewing their crops, the canecutters slashing down their abundant harvest, the fussy tramway engines dragging long lines of cane-laden trolleys through the fields to the nearest mill, where, working twenty-four hours a day with three shifts, elaborate machinery, and contented workers are squeezing out Australia's sugar." Mr. Donald Mackinnon, some time High Commissioner for Australia in America, had that to say in the course of a recent Press interview in Melbourne on North Queensland affairs. "The sugar belt, from Townsville to Cairns," he added, "is at the moment the most heartening part of Australia that any Australian can look upon. Our country can nowhere else show the same spectacle of man-directed energy. Nowhere else in the world is the white man handling tropical production with such success. There is a big Australian responsibility on those who are building up this part of our country. It is our vulnerable frontier, and we must be watchful lest, through misconception, we do them an injustice and discourage them in their important responsibility."

### **The Romance of Queensland.**

"**Q**UEENSLAND has more romance in its settlement than any other State," said Mr. Amery, Secretary of State for the Dominions in the British Cabinet, at a public function at Maryborough, which he visited in the course of his recent tour in this State. He added that it had been borne upon him what a great and rich State Queensland was. First, there was the romance in the fact that Queenslanders had courageously developed this great heritage of theirs with white labour. They had departed from all the experience of the past, and had embarked upon the experiment of building up a white civilisation from top to bottom in a tropical country. He warned them to avoid the great evils which resulted from a mixture of races of people of different planes of civilisation. They would certainly have to face difficulties—difficulties which to many other nations had appeared to be insurmountable. Time alone would show whether the ability and resource of her people would enable them to solve these difficulties. They had gone a long way towards vindicating the policy of a "White Australia" that they had set up. They had built up the sugar industry in Queensland by white labour. That was a great achievement, as that industry had hitherto been regarded as being capable of development by black labour only. He knew perfectly well that the maintenance of the sugar industry involved considerable sacrifices upon the part of Australia as a whole. But they had achieved this much. They had built up a great industry, which was conducted on a high level of technical efficiency, and by that means had supported a considerable population along this Queensland coast, which was capable in time of great development. Thus the experiment was at least well worth making. Time alone would show how far it would be successful. He was sure they had been well advised not to complicate their national life with racial problems. A policy such as the "White Australia" policy had never been attempted before in any part of the Dominions. Therefore, in respect of Queensland, that constituted a romance in itself

### **The Finger Cherry Causes Total Blindness—A Warning.**

**R**ECENT pathetic cases of total blindness in children, caused through their eating the fruit of the native loquat or finger cherry, have again aroused public attention. Warnings have been issued repeatedly by this Department as to the risk of eating or even handling this native fruit. In collaboration with the Department of Public Instruction, another notification has been widely circulated which emphasises the danger of its consumption which leads to the paralysing of the optic nerve followed by total and permanent blindness, and even death. A number of cases, the Minister for Public Instruction (Mr. Thos. Wilson) said, in his announcement to the Press, had lately been reported from the Cairns district, but his Department had taken action in this respect as far back as 1914. The circular just issued contained a coloured illustration, and one was being sent to each group of sixty children so that ample provision was made for the bigger schools. The printed statements in the circular set forth the danger accompanying consumption of the finger cherry and warning children against handling, eating, or having anything whatever to do with it. Teachers were asked frequently to direct the attention of the children to the illustration and facts set forth in the circular. The fruit occurred in the scrub lands between the Herbert River and a point beyond Cooktown. It has also been reported as existing as far south as Mackay.

### **An American Looks at Australia.**

**C**OLONEL BIRCH HELMS, representative of Messrs. Blair and Co., one of the leading bond operating houses in New York, lately visited Australia to investigate financial conditions. In the monthly publication of Blair and Co. he has issued a short statement of his impressions. He describes Australia as "a virgin land with wonderful pastoral prospects. In time it will feed and clothe the world, with its tremendous resources of wheat and wool, beef, dairy products, and fruit." The country, he says, has a promising future, but in attaining the peak of its development large investments of foreign capital will be required. Here England and the United States will find a useful opportunity for the investment of their funds. He says that through the adoption of a protective tariff Australia is endeavouring to build up an industrial community in its midst, and large foreign corporations are establishing their manufacturing plants in the several States of the Commonwealth. However, pastoral and agricultural development seemed to Colonel Birch Helms to be the great promise of Australia for the next few years, as the climate, like that of California, is very salubrious and equable. In fact, the average man lives under better conditions and has more time for recreation than has any other individual on the face of the earth—the American not excepted. Australia is described as an ideal country for pioneering Britons and Americans to settle in, just as was the Far West of the United States in the early eighty's. The pioneer spirit, he remarks, is welcomed in Australia, for it is this spirit of the country which is evidenced in the establishment of a new capital at Canberra for the Commonwealth, now aged only twenty-six years.

### **Primary Produce Experiment Stations.**

**F**ROM a farmer's point of view the most important measure submitted to Parliament in the present session was the Primary Produce Experiment Stations Bill, which was introduced by the Secretary for Agriculture (Mr. W. Forgan Smith) on 8th November. The object of this measure is to establish experiment stations to serve agriculture in general along lines similar to the organisation of the Sugar Experiment Stations, which have proved so valuable in the sugar industry. Under its provisions more immediate consideration will be given to banana-growing, which has developed into one of our best land-settling agencies. Further expansion of this industry must follow intenser settlement of our tropical jungle lands and, as in other forms of husbandry, the effective control of pests and diseases is a substantial factor in its success. Science is to be called into economic service, and by the establishment of experiment stations in what might be called strategical areas, it is planned to equip the banana grower with all the information and guidance necessary for him to solve his biological, pathological, and cultural difficulties. Much research work of immense benefit to the industry has already been done by both the Department and the University, but it is obvious that the establishment of an experiment station right in the field, so to speak, will be followed by greater co-ordination of effort in community service and more active co-operation of the farmer with the scientist in the fight against the pests and diseases that levy undue toll on primary industry. One of the special features of this issue is the report of the Minister's second-reading speech on the measure, which will be read with interest by all concerned in the enrichment of our rural life.



# Bureau of Sugar Experiment Stations.

## THE SEASON'S SUGAR PRODUCTION.

The Director of Sugar Experiment Stations (Mr. H. T. Easterby) has announced that the tonnage of cane to be crushed this season, according to the estimates supplied by the mills, is about 3,576,092 tons.

This should give an output of some 483,000 tons of raw sugar of 94 net titre for Queensland, which will be the highest production, with the exception of 1925, when it reached 485,585 tons of raw sugar for Queensland.

The present season has been exceptionally favourable to the ripening of the crop, and the commercial cane sugar in the cane has been on the high side at nearly every sugar-mill.

The production in New South Wales will be about 23,000 tons of raw sugar. This is not so good a crop as last year. With the small production of beet sugar in Victoria, the total yield for Australia should be about 508,000 tons, practically all raw sugar, and it has been necessary to export sugar overseas in larger quantities than in 1926.

## ENTOMOLOGICAL ADVICE TO CANEGROWERS.

By EDMUND JARVIS, Entomologist.

### Be Ready to Combat French's Cane Beetle.

During the present season third-stage grubs of *Lepidiota frenchi* Blkb. may be expected to cause local damage to young shoots of plant and ratoon cane. These grubs, after having passed the winter in their second instar in resting-cells situated from 15 to 20 inches below ground, usually moult for the last time as soon as warm weather commences, and making their way to the upper and warmer portion of the soil start feeding again.

Keep a good lookout for indications of the presence of this cane pest, which is betrayed by sudden wilting and yellowing of the affected shoots. Fortunately such attack is generally confined to small areas, and on this account may easily be overlooked when affecting a stool here and there. In the event of decided infestation, extending over several square chains, it is advisable to fumigate the stools with carbon bisulphide. This should be done with as little delay as possible, as two or three third-stage grubs of this beetle are able to effect serious root damage in a period of twenty-four hours. Use an ordinary hand pal-injector, such as can be supplied by Danks and Co., of Melbourne, or Cooper, Pegler, and Co., Limited, London E.C. Allow at least four days to elapse after a heavy downpour before fumigating friable well-drained volcanic soils, and six to eight days in the case of clay-loams.

Treat both sides of affected rows with  $\frac{1}{4}$  oz. injections made 15 to 18 inches apart and 4 to 5 inches from the nearest plants.

Keep the top soil in loose well-worked condition throughout the aerial existence or fighting season of the beetles.

### Watch for Emergence of Cane Beetles.

Greyback cane beetles are likely to emerge this month, immediately after the first heavy thunder showers. Any farmer chancing to notice unusual numbers of these beetles congregating in one place, in a manner suggesting that something might have attracted them to the spot, are asked to at once communicate with the Entomologist at Meringa Experiment Station, by 'phone or by wire, in order that such occurrence may receive thorough investigation.

In the event of large numbers of greybacks being observed in feeding-trees growing close to cane land, these should be collected and destroyed. Control work of this kind will be found profitable during a period of about six weeks dating from the day of emergence of cockchafers from the soil. The position near fences of favourite food-plants of this cane beetle—notably the native figs of either small-leaved varieties, such as the "weeping fig" or broad-leaved kinds, or the so-called "Moreton Bay Ash" (*Eucalyptus tessalaris*)—should be located a few days before appearance of the beetles, to be collected from during the fighting season.

**Moth Borers are still doing Damage.**

Young shoots of ratoon or plant cane showing "dead-hearts" should be cut out, taking care to sever same at a point about 2 inches below ground level, and be either burnt or crushed to destroy caterpillars or pupæ or moth borers, three species of which are at present breeding in cane shoots.

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**CANE BORING INSECTS.**

*The Director of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report from Mr. J. H. Buzacott (Assistant to Entomologist at Meringa Experiment Station) on a recent visit to the Babinda area. This was undertaken in order to obtain puparia of Ceromasia sphenophori, and to make certain observations in connection with the occurrence in that district of various cane-boring insects.*

**BABINDA.**

This district was visited on the 2nd October, and whilst there the opportunity was taken to inspect some of the outlying sections as well as farms in the immediate vicinity of the town.

**Beetle Borer (*Rhabdocnemis obscurus* Bois.).**

The beetle borer was the chief pest met with, and this was fairly bad everywhere. The infestation was at its worst in Badila crops, although Clark's Seedling had also suffered considerably.

On many farms Tachinid flies were found to be firmly established, but these latter received a severe check during the cyclone; for whilst the terrific wind and rain would easily destroy the delicate adult flies, at the same time damaged cane and humid weather would present ideal conditions for a heavier infestation of borers. In fact, the borer was noticeably present in the tops of practically all cane that had been injured during the blow.

**Grubs.**

Very few blocks of cane obviously affected by grubs were seen, and an area at Mooliba which, last year, was markedly attacked, this year shows no indication of their presence. On one selection at Bartle Frere, male digger wasps were seen in large numbers, flying over the ground between the rows of young cane and presumably awaiting the emergence of females.

**Large Moth Borer (*Phragmatiphila truncata* Walk.).**

"Dead-hearts" caused by caterpillars of the large moth borer were in evidence everywhere, particularly in cane closely bordered by dirty headlands. Quite a number of pupæ were found on stripping the trash from the tops of the cane.

**Tineid Moth Borer (*Ephysteris cheresaea* Meyr.).**

Larvæ of this minute insect cause similar damage to that caused by the large moth borer, but the Tineid only tunnels in very young shoots, principally of ratoon cane. It was encountered in many places, and at Mooliba was seriously damaging the shoots of young ratoons.

**Bud Moth (*Opogona glycyphaga*, Meyr.).**

The bud moth was quite common, but its larvæ did not appear to be causing severe damage anywhere.

**Army Worms.**

One of the species of army worm (*Cirphis unipuncta*) was very prevalent, and at Babinda was responsible for stripping to the midrib the leaves of 7 acres of young plant cane. At the time when the inspection was made, all the larvæ had pupated in the soil, and an Ichneumonid wasp (*Lissopimpla scutata* Krieg.), one of the chief pupal parasites of this army worm, was to be seen in thousands flying over the field. It is probable that very few of that destructive brood of caterpillars will escape the assault of the Ichneumons and various other parasites, and so the cane will not be further destroyed by an attack of a second and larger brood of plague worms.

Other of the very minor pests were observed, such as Linear bugs, aphides, and leaf-eating beetles, but as these were not of any economic importance, no comment is made upon them.



## CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report from the Entomologist at Meringa, Mr. E. Jarvis, on the work of this Experiment Station during the period, September to October, 1927:—

### Fumigation of Pupae of Greyback Cockchafer.

Laboratory experiments conducted at Meringa during August, 1921, proved conclusively that pupæ of this cane beetle, when lying in compact soil, quickly succumb to fumigation with carbon bisulphide, the fumes from which appear to find ready entrance through the large open spiracles described last month (August to September report). Following up this matter, preliminary field tests conducted during September, 1921, demonstrated that this fumigant is able also to penetrate through the walls of the subterranean pupal chamber of this beetle; injections made at a depth of 8 inches from the surface in ploughed ground proving fatal to pupæ lying at an average depth of 11 inches. Subsequently, in 1923, it was found that half-ounce injections of bisulphide, administered on both sides of rows on which the cane had been destroyed by grubs, and placed 15 inches apart, 6 inches from centre of stools, and 8 inches deep, yielded excellent results on red volcanic high land, which had been ploughed about 5 inches deep. When examined twenty-four hours later we discovered that the fumes had entered pupal cells situated fully 18 inches below the surface, and in those where transformation from pupa to perfect insect had taken place had killed the beetles.

### Some of the Dangers induced by "High Cutting."

An extract from a publication dealing with the control of conditions associated with root diseases of sugar-cane appeared in last month's "Australian Sugar Journal" (vol. xix., p. 372), in which certain ill-effects likely to result from the careless practice of high cutting were pointed out by the author, J. A. Faris, of the Cuba Central Experiment Station.

Irrespective, however, of such drawbacks as reduction of plant vitality—owing to the failure of shoots springing from buds above ground to establish roots—it will interest Queensland growers to learn that in portions of the Cairns district high cutting has a tendency to encourage the activities and distribution of the smallest of our three common moth borers of cane, *Ephysterus chersæa* Meyr.

This little insect, which has been termed "Tineid moth borer" (see Bulletins Nos. 11, 18, 19, 3 (revised edition)), was described by the present writer in the year 1919, when bred for the first time from young ratoons collected at Meringa, Kamma, and Pyramid, the tiny caterpillar tunnels in the basal portion of young cane shoots (5 to 10 inches high) biting through the central core and killing the heart-leaves. Outwardly the damage corresponds in general appearance with "dead hearts" caused by our two other moth borers, *Phragmatiphila truncata* Walk. and *Fossifrontia* sp. Unlike larvæ of the latter moth, however, the caterpillars of *E. chersæa* never feed upon or inhabit the central rotting core, often, indeed, vacating a shoot as soon as having tunnelled across the juicy basal portion, and entering another ratoon. During August, 1926, an outbreak of this borer occurred at Redlynch, Stratford, and Freshwater, near Cairns, among ratoons growing both in alluvial sandy soils, and high lands of volcanic origin; the cane attacked being in all cases Badila.

Further, during the present month (September, 1927), this pest was reported by Mr. J. H. Buzacott, Assistant to Entomologist, as occurring rather commonly in shoots of ratoon cane on various cane areas around Mooliba, in the Babinda district.

Not being an indigenous species but having, in the opinion of Dr. Guy A. K. Marshall, been probably introduced into Australia from Natal, it is quite possible that in the absence of its own natural enemies and other controlling agencies this insect might in a country like Australia increase abnormally and, perhaps, become troublesome to canegrowers in the near future. In India it bores the stems of rice plants (*Oryza sativa*) and certain native grasses, but appears to be effectively controlled in that country by its natural parasites.

In the Cairns district this moth attacks chiefly ratoons which, on account of high cutting, happen to spring from buds situated above ground level, such injury being far less noticeable among shoots of plant or first ratoon crops which originate mostly from buried eyes. During an infestation at Pyramid, occurring on a clay-loam river flat, an average of about one-third of all the ratoons in each of the twenty stools examined—taken from three different spots on the affected plantation—had been destroyed by moth borers during a period of less than four weeks' growth; about 50 per cent. of this loss having been effected by *Ephysteria chersæa*.



PLATE 145.

EXAMPLE OF GOOD CUTTING, AT ABOUT GROUND LEVEL, SHOWING POSITION OF BORER TUNNELS CLOSE TO THE GROUND, AMONGST ADVENTITIOUS ROOTS DUE TO SHADED CONDITIONS BETWEEN THE CANE ROWS.



### High Cutting Encourages Breeding of Weevil Borers.

Growers should note also that high cutting of cane chancing to be infected by the beetle borer, *Rhabdocnemis obscurus* Boisd. cannot be too strongly condemned.

The larvæ (grubs) and pupæ of this dangerous pest generally occur in the last inch or two of the stick nearest the ground, this being especially the case in light infestations, when the bottom of the cane at about ground level is almost invariably the portion attacked. One of the best methods of controlling this beetle borer is to cut the crop low, by which means practically all the larvæ and pupæ likely to be present on a plantation are thus removed from the land and destroyed during the process of milling. In the event of high cutting of the crop, however, a large percentage are sure to be left behind, and these larvæ, after transforming into pupæ and stopping in their tunnels for a time, ultimately produce beetles which at once turn their attention to next season's ratoons.

The accompanying photo. of basal portions of cane sticks (from a crop slightly attacked) illustrate the abovementioned habit of this insect of injuring the cane at about ground level.

Evidence of this may often be seen on trucks of borer-affected cane standing in a mill yard, where it will be noticed that about 60 per cent. or more of such damage is usually betrayed by holes in the bottom ends of the sticks, indicating where tunnels of this beetle borer have been cut through transversely.

### Controlling Third-stage Grubs of *Lepidiota frenchi* Blkb.

In districts where good rains were experienced in September the grubs of *Lepidiota frenchi* ("French's cane beetle") may be expected to cause damage during the next three months (October to December). This will be effected by grubs which have passed the winter in resting cells, 15 to 20 inches below ground level; and after moulting into the third instar made their way to the surface upon feeling the approach of warm weather.

Damage by this pest is fortunately confined mostly to small areas of a square chain or so, on which in many cases only a few stools are seriously affected; external symptoms resembling those caused by grubs of the greyback cockchafer.

Upon first observing signs of wilting or yellowing of the leaves, no time should be lost before fumigating such stools with carbon bisulphide. Be careful to allow at least four days to elapse after a heavy downpour before treating friable, well-drained soils, and six to eight days in the case of clay-loams.

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## CANE PESTS AND DISEASES.

*The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report upon the Mossman district from the Assistant to Pathologist, Mr. E. J. F. Wood, B.Sc., for the period 5th October to 13th October, 1927:—*

### MOSSMAN.

The disease situation in this district seems to have improved upon that which prevailed last year, for many fields have been pointed out to me as having been ploughed out owing to Leaf Stripe infection. As the season is more than half over, the present is rather an unsatisfactory time to come, as it tends to lower the percentage of disease observed. Much of the ratoon cane is not yet old enough to allow of inspection, and this will be the case until the new year. Furthermore, many of the blocks which remain uncut at present will be ploughed out, as cane intended for ratoons is usually cut earlier to give the crops time to mature for next year. For these reasons the inspection made recently will give an erroneous idea of the amount of disease present, as it is apparent to one in the district that Leaf Stripe is more prevalent than my figures for the farms inspected show. The work given in this report is based on the general trend of things in the area.

I am very pleased that the mill is attacking the question of seed control, and must congratulate the manager and cane inspector on the vigour with which they are working along these lines. The farmers are urged to buy all plants from other farms solely through the mill, so that they will have a reasonable chance of getting healthy plants. I am also glad to see that many farmers appreciate the effort that the mill is making in this direction, and I think that they may rest assured that the Pathological Staff of the Bureau will give them all the assistance that they

can. The cane inspectors usually make a preliminary inspection of cane which is to be sent to another farm, and this is the only satisfactory way of exchanging plants.

I know of one case where a farmer was warned by one of our staff that a block of cane was diseased, and, subsequently sold it to other farmers for plants. Luckily, they were warned in time, and the majority did not plant it. This sort of thing is criminal, and steps should be taken to punish a farmer who knowingly sells badly diseased cane, and thus jeopardises the whole district. This sort of thing undoes all the work that others may do to control the disease situation.

There is still one stool of Mosaic in the area, and the farmer through negligence still allows it to remain. It has now been there two years, and the farmer has known about it. Just at present it is not showing, as the cane has just been cut, but I urge him to get rid of it as soon as it does show.

Leaf Stripe and Leaf Scald are the two serious diseases in the district, and both are widely distributed. The former attacks B. 147, Q. 855, and D. 1135, so that these canes should be carefully watched, as also should Pompey, which is being planted on the poorer soils. Where the disease is bad the cane should be ploughed out after harvesting, as the wind-blown fruits are easily carried, and the disease can spread rapidly with the prevailing wind. In lightly infected fields, the diseased stools should be ploughed out, especially on those to windward. Burning the trash of infected fields is advisable, and the wholesale burning of cane probably tends to prevent the disease from spreading more than it does.

Leaf Scald was observed to be causing considerable damage in a field of Badila at Whyambeel Creek, and in Goru and Clark's Seedling near the town. The latter two canes are affected all over the area, though there are some farms in which the latter variety is clean. On one farm the disease was seen badly affecting a young field of plant cane of this variety—due entirely to lack of seed selection. This field was planted by contract without proper supervision. Luckily most of the diseased cane was dying, but not enough to prevent a few stools carrying the trouble over to the ratoons.

In the Mowbray area no Leaf Scald or Leaf Stripe was found, and here is a source of clean seed cane for the other areas. On some of the farms on the River, Spindle Top was seen, though this trouble seems very restricted. Other farms were apparently clean, and the thick black Badila is the truest to type seen since I left Ingham.

The following areas were visited:—Both banks of Whyambeel Creek up to Falls Creek, Saltwater, Myalo, Boondarra, Ferndale, Cassowary, and Mossman itself; and Scald and Stripe occur in all of them.

With regard to varieties—

Badila needs careful attention and selection of plants to free it from Leaf Scald.

Clark's Seedling (H.Q. 426) is a very sweet cane and well suited to the area, but is very susceptible to Leaf Scald, though not to Leaf Stripe. Farmers with infected fields should get rid of the variety as soon as possible and then get clean seed from another farm through the cane inspector. Scald will wipe out the cane, as at Goondi.

Goru should be a prohibited variety, as it is only a carrier for Leaf Scald.

Pompey should be carefully watched and its planting regulated, as it is known to be highly susceptible to Leaf Scald and Leaf Stripe. I regard it as dangerous in this area.

Q. 813 is a cane with very fine powers of disease resistance, and gives a fair crop with a good density. It matures early, strikes and ratoons well. It is not planted nearly as much as it deserves.

E.K. 28 gives a good density and crop, planted at the right time, but is a slow striker and ratooner. It should not be planted at Mossman before September, and matures late. It is susceptible to disease and should be watched.

Korpi, Oramboo, Nanemo are apparently giving good crops in tonnage and c.c.s., and the two former canes are worth a thorough trial. The latter is suspected of being susceptible to Leaf Scald, though little exact information on these canes is available.

B. 147 is highly susceptible to Leaf Stripe and should not be planted where this disease is present. Otherwise it is a good cane.

Q. 855 is also susceptible to Leaf Stripe, but is a good variety otherwise.

B. 156 is susceptible to disease, and is not a desirable cane.



*The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report on the Cairns district from the Assistant to Pathologist (Mr. E. J. F. Wood, B.Sc.) for the period 13th October to 16th November:—*

### CAIRNS.

The disease situation in the Cairns district is not satisfactory, as, apart from the presence of Leaf Scald and Top Rot, which are widespread, there are Mosaic, Gumming, and Leaf Stripe in limited areas, and the farmers do not seem to realise sufficiently the importance of exterminating them before they become a serious menace to the industry. It is in order to impress this aspect on them that I submitted a separate report on the Mosaic and Gumming situation in this area.

#### Leaf Scald.

Leaf Scald is widespread, and was observed in the Mulgrave area at Aloomba, and right through to Deeral. It is very prevalent in this area, but less so at Highleigh, and occurs on most farms at Riverston, Upper Mulgrave, and the Little Mulgrave. In the Hambledon area the disease is, on the whole, more prevalent than at Mulgrave. No plant control is exercised, and the result is ignorance on the part of the farmer, who is also uninterested in control, so long as the diseases do not interfere with his tonnage. The percentage of diseased plant cane was, I think, greater than that at any other mill except South Johnstone, and perhaps Mourilyan.

#### Top Rot.

Top Rot is occurring all over the area, and is very puzzling in the aspect that it presents. It was seen on the Upper and Lower Mulgrave, at Aloomba, Sawmill Pocket, and through the Gap, at Freshwater, Redlynch, Jungarra, and Smithfield. It seems to be at its worst, however, on the river flats. In all cases it is in the "red streak" stage, and has been reported to have appeared and disappeared again in the course of a fortnight. On one farm a field was inspected and found free, and a fortnight later showed the disease on reinspection. At the beginning of my visit (17th October) the disease was hard to find, even on farms which are, as a rule, very subject to the disease, while at the end, a month later, it was showing up very markedly on most farms in the Freshwater area, where it seems to be most prevalent.

#### Leaf Stripe.

Leaf Stripe is confined to a small patch at Highleigh which is to be ploughed out, one which is being carefully rogued and on which no disease could be seen at Hambledon, and four farms at Sawmill Pocket. The affected varieties are D. 1135 and Pompey. Clark's Seedling, both at Mossman and on the Burdekin, seems to have some powers of resistance to this disease, and it would perhaps be well to replace the susceptible canes by this variety, for the time being at any rate. The danger lies in the susceptibility of B. 147 to the disease, as this cane is extensively grown in the Mulgrave area, and is gaining favour at Hambledon.

#### Cane Varieties.

It is suggested that, if possible, the varieties Korpi and Oramboo be introduced to the areas, as Pompey and Clark's Seedling are susceptible to diseases. Nanemo seems to be susceptible to Scald, for this disease was seen in the variety at Babinda, and in the Mulgrave. Q. 813 is a cane worth growing, and some farmers have already had good results from this cane. The resistance of this cane to disease is well known.

The farmers are urged to do their utmost to get rid of the diseases which are just coming into the district, even if it necessitates drastic measures, and to watch the planting of all Badila and other canes so as to control Leaf Scald.

Farmers in the Cairns district who desire information with regard to diseases should get in touch with Mr. Curlewis, the secretary of the Cane Growers' Council, who will communicate with me, or with the Pathologist who happens to be nearest.

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*The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (17th November, 1927), on Mosaic Disease in the Cairns district, from the Assistant to Pathologist, Mr. E. J. F. Wood, B.Sc.:—*

#### Mosaic Disease in the Cairns District.

This disease has previously been reported by Mr. Gibson, Northern Field Assistant, from two farms in the Hambledon area, and the occurrence was confirmed by Mr. Kelly, of the Bureau. It was seen in both cases in Shahjahanpur, a cane after the Uba type, which has a thin stick and is a profuse stooler and is, in Queensland, 100 per cent. infected with Mosaic as far as our records go.

I have to report a new occurrence of the disease in the Mulgrave area, where no previous records of the trouble exist, except for an isolated case at Aloomba in H. 109. This block and one of the infected farms at Hambledon have been ploughed out, but the other block, which has been in existence for some years, is being cut, and the farmer promises to plough it out.

An example of the danger of leaving such a field came under my notice recently. A farmer happening to be on this farm saw the cane which is carrying the disease, and which incidentally shows little signs of the infection, and thinking it a new variety, took some plants home, with which he filled up the misses in some plant cane (Pompey). Now Pompey is a highly susceptible variety which shows up the disease very markedly in loss of tonnage, and the spindling and dwarfing of the stick, so that, had I not gone on to the farm when I did, it is possible that all his varieties would have been badly infected during the next few years, for all his canes (H.Q. 426, Pompey, and D. 1135) are very susceptible. In this way, the negligence of one farmer and the extreme carelessness of another might have laid the district open to an epidemic of another serious cane disease.

With regard to the Mulgrave outbreak, which occurs at Highleigh, this is in two fields of B. 156, the plants in both cases having been brought from Mossman. This cane is highly susceptible to disease, especially Mosaic, and should on no account be planted in the Mulgrave area, especially after this discovery. Both the farmers on whose farms the disease occurs have planted up areas of the diseased cane, and this is going to serve as a source of infection to the other farms and varieties in the district. The farmers are urged to get rid of these fields as soon as possible. It would pay them to plough the canes straight out, and to cut their losses.

A rather peculiar feature about the Mosaic in the Cairns district has been its slowness in spreading by secondary infection, and this is possibly due to the fact that the carrier is not present in the area or is at least unimportant. Many farmers, especially in the Mulgrave area, have recently planted corn, and it is well known that the corn aphid is an insect vector of Mosaic. Whether this insect is present on the corn I do not know, but I do not doubt that it will soon become so, and when it does we will have the complete cycle for the spread of the disease. I have seen Mosaic on the corn so planted. For that reason I would warn the farmers against the planting of maize, as they will see from Mr. Bell's reports to the Bureau, the ravages of Mosaic where it is grown with corn in Louisiana.

We must look to the immediate future as well as to the present, and even the biggest rivers have small beginnings. It is from such negligence, or lack of knowledge as I have instanced above, that most of the serious epidemics of diseases in canes have begun. The introduction of half a dozen sticks of gummed cane is supposed to have caused a serious outbreak of this disease on the Clarence. This is the reason for my stressing the occurrence of this disease, which is able to cause most serious ravages.

It has done so in South Africa, where they have been reduced to the planting of Uba, which is, I think, agreed by men who have studied the question to be a very retrograde step, but the only one which could cope with the situation. This is the opinion of all those whom I have met who have studied the Uba question abroad. The same course was adopted in Porto Rico, and the Bulletins which they published at the time show what ravages the disease was causing there. Cuba controlled the disease by seed selection and rogueing or digging out the diseased stools, and vast sums of money were spent on this. In Louisiana the position is still critical, as Mr. Bell's report shows, and even in the southern districts of Queensland the position is far from satisfactory.

Mosaic is an insidious disease which does not seem to affect the crop to any extent, and may at the same time reduce the tonnage very greatly. Five tons per acre are not unusual, but this does not appear to any extent to a man looking at the field, and 5 tons on 30 acres are 150 tons, roughly £300.

The time to strike is at present, before the disease gets a hold. It is wrong to say "it is not spreading" and to take no more notice, for by the time it really does spread it will be too late to eradicate the disease without very great expense.

### Gumming.

The gumming situation at Aloomba seems to have improved considerably, and only one farm was seen to be infected. The cane was H. 109, and the farmer has ratooned it again in spite of my advice. Gum is an insidious disease and seems to lie dormant sometimes for long periods, so it is hard to state the exact position. Farmers should watch for a recurrence of the disease, and should plough out the cane as soon as possible after they notice the trouble. There is no need to do more than to point to the trouble which the Bundaberg mills have had with gum this year.



### Cane Crops Prospects.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, who has been visiting the sugar districts of Cairns, Innisfail, Mourilyan, South Johnstone, Herbert River, Mackay, and Bundaberg, has returned to Brisbane. He reports that the present season has, on the whole, been particularly favourable to the growth of cane, and has also had a marked influence in ripening the crops, so that the commercial cane sugar this year has been exceptionally high. The consequence will be a large yield, second only to the 1925 season.

In every district the outlook for next year is most favourable, and if the ensuing climatic conditions are good, it is possible that the 1925 season may be eclipsed.

### CAIRNS.

At Cairns, the mills were working smoothly and putting through large tonnages of cane every week. The crop, due to the cyclone earlier in the year, was not so large as in the two previous years, but was of excellent quality. Great quantities of sugar were being manufactured and shipped away. Parts of the Cairns district were dry and wanted rain, but showers have since fallen.

A visit was made to the Atherton Tableland with the secretary of the Cairns-Mossman Cane Growers' Executive (Mr. Curlewis), and the Mulgrave Mill cane inspector (Mr. Hoare) and two officers of the Sugar Bureau, for the purpose of inspecting cane growing on the Tableland and at the Kairi State Farm as to its suitability for plants, and to ascertain if a supply could be depended on. The Cairns executive have taken this matter in hand, and the Bureau will, by means of its officers, inspect the cane from time to time as to freedom from pests and diseases.

### JOHNSTONE RIVER.

The next district visited was the Johnstone River. At Innisfail the weather had been dry and cool for some time, but useful showers were then falling. The cane was cutting out well. Matters at South Johnstone Mill had considerably settled down, and the mill was putting through about 6,800 tons of cane per week. Owing to the long drawn out industrial turmoil, however, it will be impossible to crush all the cane, and the estimate has been reduced by some 50,000 tons of cane, some of which being cut late last year may stand over. Up to the end of October 81,000 tons of cane had been crushed.

The Goondi Mill was doing fine work, and it is expected that all the crop will be harvested by the end of this month.

At Mourilyan, a new fourth mill had been put in. This factory was experiencing a good run. The average commercial cane sugar for the season had been 14.5 per cent., but at the end of October was 15.3 per cent. Many new improvements to the mill were noticed.

The Tully Mill was handling a big crop and working most successfully. The very high tonnage of 8,051 was put through the rollers during one week.

Owing to shipping shortage sugar stocks were not getting away as rapidly as desired. 2,500 tons of raw sugar were stored at Mourilyan, and 3,500 at the South Johnstone Mill.

Grubs were not very bad this season, but the beetle borer was greatly in evidence. The most serious disease is Leaf Scald, to which the Pathologist of the Bureau was devoting considerable attention.

Owing to the prolonged cool weather the germination of the young plant cane was slower than usual at this time of year.

The harvesting of the experiment plot at South Johnstone was finished on the 25th October. Some of the new seedlings raised at that station had given fine results, one in particular yielding 77 tons of cane and 11 tons of sugar per acre. It is hoped that next year a few of these new South Johnstone seedlings will be available for distribution.

### HERBERT RIVER.

Thanks to the courtesy of the Colonial Sugar Company's officials, the writer was enabled to see a great deal of the Herbert River in a short time. This district has made a wonderful recovery from the appalling disaster which overtook it in February last by floods. Nature can overcome its ravages, but the large loss of life which then took place will not be forgotten quickly. Large plantings of cane have taken place in all areas, and, if favourable weather ensues, a tremendous crop is anticipated for next year. Grubs were not doing much damage and the beetle borer is not affecting more than 1 per cent. of the cane. The disease situation is being kept well in hand by the company on the Herbert River.

### MACKAY.

A record crop is being harvested in the Mackay district, and it is anticipated that 100,000 tons of sugar may be manufactured. The present official estimate for Mackay is 98,000, but if the commercial cane sugar content is maintained the crop may easily reach the century. This district is in a very prosperous condition, as land values have never been inflated and the wealth produced is largely spent in the district. The mills are all doing excellent work, and some high tonnages are being crushed weekly. The commercial cane sugar is very high. Demonstrations of the Falkiner Cane Harvester were taking place during October. This is an elaborate machine, very different to the original. It is not yet perfect, and requires further experimentation.

The Farleigh Mill at Mackay has a big crop this year, and since its taking over by the farmers last season has been doing well. A large tonnage of cane (55,000 tons) is now drawn from the Northern coastal areas opened up by the railway. It is contemplated to put in a new large fourth mill next year. The mill has done and is continuing to do good work. At one time a large quantity of Uba cane was grown (up to 25 per cent.). This has now declined to 2 per cent.

### BUNDABERG.

A fine harvest is also being experienced in the Bundaberg district, though some crops were affected by frost earlier in the year, and a considerable area has been injured by the gumming disease, which, unfortunately, is very prevalent this season. More resistant varieties must be introduced. So far Q. 813 and H. 227 show great resistance to the gumming disease. Varieties showing high resistance to this disease in other countries have been imported by the Sugar Bureau for trial, and it is also hoped that some of the new South Johnstone seedlings will also prove resistant.

The weather experienced in the North was wonderfully cool for this time of year, due to the prevalence of south-easterly winds. As a rule, the north wind is much in evidence in October and November, but not so this year. Another factor was the continued cloudy weather. It looks like a repetition of the 1916 season, which was followed by a record crop. Everywhere large areas have been planted, and if conditions remain favourable a large crop should eventuate next year.

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*The Assistant to the Entomologist at Meringa, Mr. J. H. Buzacott, has submitted the following report (18th November, 1927) to the Bureau of Sugar Experiment Stations:—*

### HAMBLEDON AREA.

The following pests were observed during the week ending 10th November, on farms served by the Hambledon Mill:—

#### Wasps Attacking Sorghum.

On the 1st November a visit was made to Redlynch to observe some wasps attacking a crop of sorghum out there. They proved to be specimens of a small *Crabronid* which were nesting in the stems up near the seed head by tunnelling out the pith and stocking the cavity thus formed with small flies (*Acalyptata* and *Trypetidae*). Practically every stick in the small crop examined was treated in this manner, the nest occupying about a foot of the upper end of the stem. The infestation is hardly of economic importance, as neither the growth nor the seeding of the sorghum seems to have been affected, although in a heavy wind the weakening of the stems thus would probably cause them to break.

It is most unlikely that this same insect would ever tackle cane, unless perhaps the stem of the arrow when the cane went to seed.

#### Beetle Borer.

Some farms on the Barron River flats, which in the last few years have not had beetle borers, are suffering from its ravages this year. The February flood and cyclone is probably responsible for this spread or reappearance, whichever it may be, but the infestation was comparatively light in every case which came under notice.



### Moth Borers.

The moth borer has been bad at Sawmill Pocket this season as evidenced by the large number of "dead-hearts" to be seen. These are particularly numerous in places where the flood deposited debris.

In Stratford, Freshwater, and Redlynch "dead-hearts" were also fairly common.

### Tineid Moth Borer.

This little pest (*Ephysteris chersæa*) was damaging young ratoons at Redlynch and Freshwater.

### Grubs.

Grubs of French's Cane Beetle (*Lepidiota frenchi*) are up working after their resting period deep down in the ground. They are now in the third stage, and are considerably damaging cane in Sawmill Pocket. They are eating the sets of young cane bare of roots, and the consequent wilting and dying of the leaves is becoming very noticeable.

### Termites.

A small species of termite (*Coptotermes* sp.) was discovered to be the cause of young plant cane dying on a farm at Edmonton. The termite was completely hollowing the sets, thereby removing the shoot's source of nourishment. The field in which they were observed was surrounded by forest and the soil was very dry. It was probably to obtain moisture that the termites attacked the cane. The small brown house ant (*Pheidole megacephala*) was exerting a considerable control by attacking the termites.

### Leaf-eating Beetle.

The leaf-eating beetle (*Rhyparida mcrosæ*) was found congregating on a small fig plant (*Ficus opposita*) growing in a canefield. There must have been many hundreds of the small beetles on the fig, and riddled cane leaves nearby showed that they had not confined their attentions to the fig leaves.

*The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has made available for publication the following report for the period October-November, 1927, from the Southern Assistant Entomologist, Mr. R. W. Mungomery:—*

### THE CANE-ROOT APHIS.

Mention was made in a previous report (see "Queensland Agricultural Journal," October, 1927, page 338) of a subterranean aphis which attacks the roots of sugar-cane, and which was found in association with the mound-building ant *Aphænogaster longiceps* Sm. This aphis is in all probability a native species, but on account of its secluded life it has remained unnoticed and undescribed. The actual instances of subterranean aphides attacking cane roots in Queensland have been comparatively rare, but as aphides are much more numerous in temperate regions than in the tropics, it is likely that more of these insects will be met with in these parts, as the entomology of sugar-cane is more thoroughly investigated in the southern sugar districts.

Although only of minor importance as a cane pest, it was thought advisable at this juncture to record the occurrence of this aphis in connection with sugar-cane. It was first noticed on the roots of ratoon cane at Oakwood, in the Bundaberg district, where numbers were found in the galleries which had been excavated by the ant *A. longiceps*. More recently, Mr. Bates, of this station, while carrying out investigations in Childers concerning cane grub control, found the same aphis attacking young plant cane. On this Childers farm, it was attended by a common small brown ant *Pheidole proxima* Meyr., and by the combined activities of the aphis and ant, the cane attacked showed a noticeable yellowing and appeared to be very weak.

So far, the winged form has not been found, but an attempt is being made to breed this form in order to establish its identity. The form most frequently met with is the wingless viviparous female, and the following is a brief description of it:—

Large pear-shaped, light yellowish coloured aphis about 3.5 mm. in length, and about 2.25 mm. at its greatest width, the body being covered with small hairs and also with a light dusting of a powdery secretion, which renders it of a duller appearance. It is without cornicles.

This species appears to be dependent to a great extent on ants, for none have so far been found on cane roots where ants have been absent. As many as thirty have been found clustered together on the roots of young plant cane, but in the case of ratoon cane they seem to be more evenly distributed over the larger root system and it is more usual to find them in groups of five or thereabouts. Nymphs, or the immature forms, when first produced are of a rich buttery yellow, and after the lapse of a few days they secrete the white powdery covering which is present on the adult insects, but they are somewhat darker in colour than the adult insect.

The writer has found the same aphid feeding on the roots of nut grass, though they were not so plentiful there as on the cane roots nearby. Thus the mere ploughing out of cane would not serve as a check on this insect, for nut grass would act as a host during the time the land was fallow, and subsequent generations would reinfest cane when it was again planted on that land. The real solution of the problem seems to be the extermination of the ants.

### **The Small Brown Ant (*Pheidole proxima* Meyr.).**

This ant, which is a very common one in our canefields, not only becomes a pest indirectly through its attendance on such sap-sucking insects as aphides and mealy bugs, but is, itself, at times also directly responsible for minor damage to cane.

From its liking for the sweet globules of honey dew proffered by these insects, it is easy to understand that the sweet juices of mature sugar-cane would also be readily accepted and sought after by them. When cane sets of the variety Q. 813 were planted for experimental purposes during this spring, ants of the above species were found to have invaded the sets, tunnelling under the hard rind and eating the softer central portion of the cane stick. This undermining of the rind at the nodes, at points from which spring the roots, prevented many of the roots from developing as they would have done under normal conditions.

These ants are often found nesting in portions of cane stools, and it is probable that they are responsible for more damage than was hitherto supposed.

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## **GRUBS FOR "GRUB."**

### **TURNING CANE PESTS TO PROFITABLE ACCOUNT.**

*The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has made available the following report from the Entomologist to the Bureau at Meringa (Mr. E. Jarvis) dealing with some of the ways in which "greyback" cockchafers and their grubs when collected in great numbers may be profitably utilised:—*

#### **Profit in Cane Beetles.**

In view of the fact that in some of our sugar-growing districts vast numbers of cane beetles and their grubs are annually collected and destroyed, it is advisable to briefly outline a few of the ways in which such valuable organic material—amounting at times to many tons in weight—may be turned to profitable account.

About the year 1913, for example, growers in the Cairns district alone caught 22 tons of "greyback" cockchafers, representing no less than 10,644,480 individual beetles, which, after being weighed in by the "receiver," were merely emptied out of the sacks and thrown away.

In Russia or France, however, the monetary value of these insects would certainly have been recognised, and the bodies converted into manure by the following process.

#### **How to Convert Cane Beetles into Manure.**

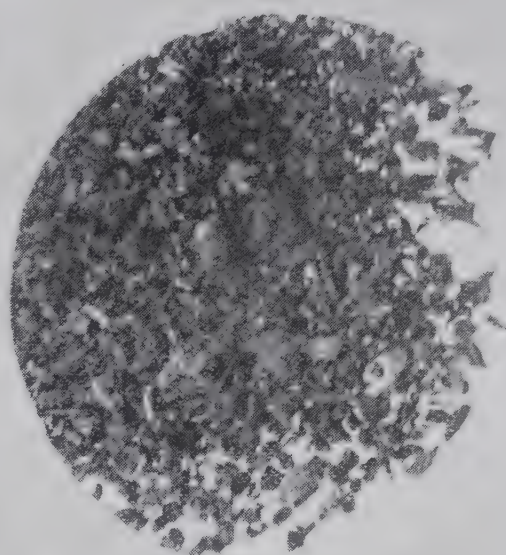
One of the best methods is to dig a pit in firm sub-soil, a few yards long, and of a width and depth of about 5 feet.

After throwing into it sufficient beetles to form a layer 3 or 4 inches deep, stir in enough lime water to prevent any specimens from crawling out, then sprinkle a dressing of dry lime over them, and on top of this a layer of earth about 9 inches in depth. Continue to fill in with alternate layers of beetles, lime, and soil, until the pit is full. In this way a manure can be prepared from cockchafers equal in value to some of the good commercial fertilisers. That obtained from the European species known as the "May Bug" (*Melolontha melolontha*) is said by Grenaux to "equal that of





A



C



D



B

## PLATE 146.

- A.—Dried grubs of “Greyback” Cane Beetle.  
B.—Dried “Greyback” Cockchafers (*Lepidoderma albobirtum* Waterh.).  
C.—Meal prepared from the dried grubs.  
D.—Meal prepared from dried Cane Beetles.

(All photos natural size, original.)

the best manure as regards phosphoric acid and potash, and is eight times richer in nitrogen. One hundred pounds of beetles are, therefore," he remarks, "equal to 800 lb. of manure, of a value of about 3s."

The dried bodies of our own "greyback" beetle contain 10.20 per cent. of nitrogen, 1.75 of potash, 1.66 of phosphoric acid, 63.75 of proteins, 4.82 of fat, and 1.75 of lime.

### Value of Cockchafer as a Poultry Food.

The very large percentage of proteins (63.75 per cent.) contained in dried bodies of our cane beetle, *L. albobirtum*, makes this insect exceptionally valuable as a food for poultry, small animals, and insectivorous birds. It should be mentioned here, that when the first specimens of this beetle were analysed in the year 1922, it was found, to the surprise of those interested in this matter, that the specimens tested contained 0.16 per cent. of arsenic.

The reason for the presence of this poison was thought at the time to be probably due to the fact that the beetles analysed had been caught close to canefields in which the soil had been treated with large quantities of arsenious acid (white arsenic), administered at depths of 3 or 4 inches at the rate of 80 to 200 lb. per acre amongst cane roots upon which grubs of this species were feeding. Seeing that these grubs are continually ingesting, and passing soil through their bodies to extract any organic matter, it appeared likely that the amount of arsenic swallowed by them in this way—although not enough to prove fatal—might gradually accumulate, and be retained in the system throughout the pupal and beetle condition. This supposition was ultimately proved to be correct, as samples of grubs and beetles of *albobirtum* caught during the last year or two and submitted to Marsh's test were found to be free from any trace of arsenic.

When visiting the Sydney Zoological Gardens in 1923, I showed examples of dried grubs and "greyback" cockchafers to the Curator, and we threw them to insectivorous birds, &c., to see if they would eat them dry, either whole or when broken into pieces. Mr. Le Souef subsequently discovered that his birds preferred them in a softened condition, and later on advised me as follows:—

"The grubs that you left were very good food, and when soaked were readily taken by our insectivorous birds. We would be glad if you would quote for the food at per lb. We might be able to use about 100 lb. per annum."

It should be mentioned here that when discussing this matter with the Curator he told me there was a sure market in Sydney for dried grubs, and there would be no difficulty in disposing of large quantities at a good price.

The most profitable way in which to market a commodity of this kind would be in the form of small packets holding about 3 or 4 oz., got up after the style of those sold to bird-fanciers, containing dried insects, puparia of flies, ant-pupæ, &c. This preparation commands a ready sale, as many kinds of birds and small animals will not thrive properly in confinement unless supplied at intervals with some such natural animal food containing certain vitamins that appear essential to their wellbeing.

A coarse meal, consisting of the crushed bodies of our grubs and "greyback" cockchafer beetles, could be more easily prepared than the abovementioned article, and would probably meet with as ready a sale. The wholesomeness and palatability of this insect as poultry food is evidenced by the avidity with which these grubs and beetles are greedily devoured by our native insectivorous birds and mammals.

In some parts of Russia the cockchafers, when used for poultry food, are first mixed with an equal volume of bran.

### Cockchafers used as a Cattle Food.

It will be of interest to state here that during the year 1918, in which a flight of the destructive cockchafer, *Melolontha melolontha*, was expected, an order was issued by the Swiss Department of National Economy desiring all Communes to collect, kill, and utilise these beetles. "Special emphasis," states N. Criddle, "is laid on this last point, as these insects form a valuable cattle food."

### Obtaining Oil from Cockchafer Beetles.

The method usually adopted in other countries for extracting oil from the bodies of these beetles is to crush them in barrels or tubs until a completely homogeneous dough is obtained, which, after the addition of water "is left," we are told by Professor A. Novak, "for three or four months. The oil rises gradually to the surface and is removed. It can be used for ordinary lamps, giving a good flame without odour or smoke; about 20 litres of oil are obtained from 100 litres of



beetles. To extract the fat, the beetles are killed with chloroform or formalin, and then placed in a glazed earthenware vessel, into which a narrow pipe is inserted, reaching to the bottom of the pot; the vessel is covered with a lid, having a hole for the passage of the pipe, and when this is heated on a slow fire, the fat will gradually flow out from the pipe. This becomes thick after cooling."

### Cane Grubs as a Food for Man.

About eleven years ago, during the great war, some very interesting experiments were made in the United States to determine the food value of grubs of beetles to the genus *Lachnosterna*, which in that country attack the roots of sugar-cane.

It was thought by Dr. L. O. Howard, Chief Entomologist at Washington, that in view of the shortage and increasing price of old staple foods at that particular time, practical suggestions regarding any cheap inexpensive foods would be eagerly welcomed by the general public. "Doubtless many foods," he remarks, "now considered excellent were first discovered by starving people. Possibly oysters, clams, snails, crabs, lobster, crawfish, and shrimps were first eaten by people who could get no other food. . . . Two kinds of insects from the viewpoint of abundance and possible food value at once suggest themselves—namely, grasshoppers, and the larvæ of *Lachnosterna* in this country, and of *Melolontha* in Europe, the so-called 'white grubs.'"

During the course of the experiments in question, *Lachnosterna* grubs were served up in the form of stew, salad, soups, &c., the various seasonings used for these foods being salt, vinegar, butter, pepper, oil, paprika, and onions. A party of ten gentlemen (prominent American entomologists) tasted and compared notes as to the flavour of the different dishes from which the grubs were eaten as well as the broth. The stew was considered by most present to taste much like crab meat and lobster.

"All thought it agreeable, and were sorry when it was all done." Those who drank the broth preparation "agreed that it was not only perfectly unobjectionable but really appetising."

The salad also was "found very palatable," although in chewing, all those present discarded the tough skin of the grubs.

The general conclusion arrived at, as a result of varied experimentation, is practically embodied in the following statement made by Dr. Howard:—"I feel sure that 'white grubs' will be shown to have a positive food value, and am equally sure that the prejudice against insects as food is perfectly unreasonable."

This opinion, coming as it does from one of the world's leading economic entomologists, and being based on results obtained from practical research work, should exercise a marked influence on any further developments of a like nature that may become necessary in the future.

It may be mentioned, in conclusion, that the protein content of beetles belonging to the genera *Melolontha* and *Lachnosterna* have been found by analyses to be similar both in character and quantity to those contained in the higher animals which form a part of human food.

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## FIELD REPORTS.

*The Central Field Assistant, Mr. E. H. Osborn, reports (1st November, 1927):—*

### BANANA POCKET.

A short visit was paid to this fertile area in the middle of September, and the conditions were found to be very good, for practically all varieties of cane were yielding good tonnages and satisfactory density. The original estimate of 12,000 tons still holds good.

Many new residences were noticed, and three substantial bridges over Saltwater Creek have been constructed. Vegetables grow splendidly hereabouts, potatoes especially being a very payable proposition, for one grower had disposed of 10 tons at £16 per ton, and still had another 4 tons awaiting sale.

### Varieties.

The main varieties are N.G. 15 (Badila), N.G. 426 (Clark's Seedling), M. 1900, and Q. 813, with smaller quantities of other canes. N.G. 15 grows splendidly, one block of third ratoons looking good enough for a 30-ton crop, whilst September plant was lying down profusely and should run into a 40-ton proposition. H.Q. 426 also looked very vigorous, one eleven-months-old crop yielding a 32-ton crop.

Q. 813 on the poorer of the soils was really good, one first ratoon paddock cutting a 40-ton crop, with an average density of 15.5. M. 1900 in the very heavy soils is also shaping well, whilst E.K. 28 was showing exceptionally good growth on a fairly good class of soil. H.Q. 409 was also being tried out on a small scale, but the stalks seemed too thin. The young plant cane looked well, as also did the young ratoons where worked up soon after cutting.

### Diseases.

The area is very free from diseases, none being observed at the time of my visit.

### Pests.

Slight damage had been done in odd places by grubs and rats. Upon the whole the prospects of the Pocket are very bright, for it possesses first-class soil, good climatic conditions, and a mighty good class of settlers (mostly ex-Diggers of the A.I.F.).

While at Banana Pocket my thanks are due to Mr. and Mrs. Lascelles for accommodation. Such help is much appreciated by the officers of this Bureau.

## ROLLINGSTONE TO INGHAM.

This region, comprising the cane area supplying the Invieta mill (Giru), was next visited. Some 32,000 tons supplied by about 100 growers represents the output of the areas inspected. Crops were cutting very well for both tonnage and density.

As regards planting for next year, it seemed to be very heavy, especially about Yuruga, Helen's Hill, and Toobanna. These latter sub-areas have progressed wonderfully since my last visit some twelve months ago, and new growers were met.

At these three places crops of splendid Badila were seen growing upon soil that was formerly considered too poor and badly drained to cultivate, and yet is now turning out very good crops, although in many cases the cultivation has been rough.

### Varieties.

N.G. 15, H.Q. 426, H.Q. 409, Q. 813, Korpi, Nanemo, Oramboo are grown. N.G. 15 is easily the most popular, and some fine crops were noticed. To Toobanna one grower, upon poor greyish soil, cut 118 tons from  $2\frac{1}{2}$  acres, getting, too, a density of 14.5 early in September, no fertiliser being used. At Coolbie, an 8-acre paddock of young N.G. 15 (hand planted and well cultivated) showed a 100 per cent. strike, and was stooling out beautifully.

H.Q. 426 is also grown to a certain extent locally, and so far looks healthy, although when its liability to gum is considered it behoves growers to be very careful, and remember that this variety is still barred by the C.S.R. Co., and that practically all the H.Q. 426 under review is the result of seed obtained from the Herbert River area, and therefore subject to suspicion.

H.Q. 409 grows well upon the poorer areas and has given good c.e.s. values, but arrows very profusely. Q. 813 upon the poorer and preferably stiffer soils turns out well, planted late, and should be more popular when its comparative freedom from disease is considered. Many inquiries were made about E.K. 28, as so far very little has been grown in the area.

### Disease.

Red Rot in H.Q. 426 was noticed in several paddocks, being very bad in one plant crop at Moongabulla, the c.e.s. values for the first two tests being 12.4 and 12.9. Probably 15 per cent. of the cane had been badly attacked.

Spindle or Needle Top disease, as described by Mr. Ferguson Wood in his August report, was met with in isolated Badila stools, and is certainly accountable for a decided loss. Control measures as outlined by him are to be recommended.

## GIRU.

The local mill (Invieta) had accounted for about one-half its crop when the area was inspected. Good growing conditions had been experienced, and, in consequence, the crops were both heavy and rich in sugar. Heavy plantings had taken place, the early plant looking uncommonly well. The ratoons, where worked up in time, were also very promising, some third and even fourth ratoons N.G. 15 carrying good growth.



**Varieties.**

Practically the same as upon the lower Burdekin. Of the newer ones E.K. 28 is very satisfactory, tonnage and density both being good; 40-ton crops averaging about 15.5 being noticed in several places. Large areas of it are now being worked for 1928.

**Disease.**

Very little disease of any sort was apparent, although doubtless present. Growers are advised to use the very greatest care in seed selection, and on no account to obtain seed from another area unless the same has been thoroughly inspected by a competent man.

**Pests.**

Grubs and borers have accounted for minor losses.

**AYR.**

With the exception of 95 points of rain at the end of September, dry conditions had prevailed, and nearly all the irrigation plants were busy. The crops were generally cutting up to about their estimate, but were carrying a very high density, as the following figures show for the week ending 24th September:—Kalamia, 16 c.c.s.; Pioneer, 16.16 c.c.s.

As well as the present season being satisfactory, next year's crop prospects are good, for large areas of early planted young cane were seen and are so far forward that they cannot fail to grow into heavy crops next year. Wherever one went surprisingly good crops were seen, and at present it seems that the two local mills will be heavily taxed to handle the 1928 crop. Where ratooning had been carried out straight away after harvesting the young cane was looking very well.

**Varieties.**

N.G. 15, H.Q. 426, B. 208, Goru, M. 1900, E.K. 28, and Q. 813 are grown, with the first three easily in the lead. Extremely good returns have been obtained from the first-named cane so far. One Norham grower started the season with a weekly average of 16.06 c.c.s. and cut 800 tons for just over 16.0 c.c.s., all in heavy plant cane.

B. 208 was also wonderfully high, another grower averaging 17.3 c.c.s. for eleven weeks, whilst another averaged 18.3 c.c.s. for one week. Its great danger to disease is, of course, the drawback, for if Leaf Stripe spreads from this variety to the others, then the damage would be very great.

E.K. 28 has given most surprisingly good results this season, from August to date, one of the best being a Brandon grower who, for a weekly average delivery of about 45 tons for the last month, has averaged 16.6 c.c.s. for a 40-ton crop, his last c.c.s. being 17.6, and a fair tonnage still to harvest.

Another Airdmillan grower is cutting a 40-ton crop of good density, which, owing to its rather backward state, had been estimated to cut 33 tons per acre. This is a particularly bad block to water, and the results are therefore most gratifying.

Practically nearly every grower has now some of this variety planted for 1928.

**Diseases.**

Diseases were very hard to discern at this period, Leaf Stripe in B. 208 being the only one apparent.

**Pests.**

White ants, grubs, borers, &c., have done a certain amount of damage in isolated places, but only to a limited extent.

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*The Central Field Officer, Mr. E. H. Osborne reports (12th November, 1927):—*

**HOME HILL.**

At this centre weather conditions were dry and practically all the growers were watering. Very satisfactory work was being carried out by the mill (Inkerman), and the estimated tonnage of 126,000 tons was expected to be put through by about the third week in December.

Unusually high density returns have so far characterised the season's operations, for good sugar contents as well as heavy tonnages have been obtained from many of the rich deep alluvial flats, that are generally rather low in c.c.s. As regards the prospects for 1928, there is every present prospect that a bumper crop will be harvested.

Very large areas of young plant cane were noticed looking well forward (the majority being early plant), and bar some unexpected reason should develop into a splendid crop. The young ratoons were also showing very healthy growth.

Taking the Home Hill area as a whole, it is progressing remarkably, and now that the irrigation system has become properly established its benefits are being experienced, and local growers are now far more satisfied.

### Varieties.

These are practically the same as grown on the Ayr side of the river. Of the newer canes E.K. 28 is easily the most popular and has given most satisfactory results both in tonnage and density, for it roughly averages from 35 to 40 tons per acre with an average density of, say, from 15.5 to 16.0. It is also worth mentioning that in many cases these returns were obtained from land that was formerly considered too rich for this cane. So satisfactory has it proved that nearly every grower has from a small to quite a large area of the cane planted for next year. Q. 813 has also given consistently good returns on several farms, and as it becomes more acclimatised to local conditions will get more popular on some of the poorer classes of soils.

### Diseases and Pests.

Very little disease was noticed during this visit, although doubtless it was present. A little Mosaic and Leaf Stripe was noticed in B. 208 young plant and young ratoons. Growers are again cautioned against planting too much of this cane so susceptible to disease, for there is nothing to stop it spreading its diseases to the other standard canes of the Burdekin, and surely growers have already enough troubles without looking for more. The after effects of Top Rot were noticed in the quantity of dead stalks on many farms that otherwise would have cut very heavy tonnages. In one or two places red streaks were noticed in young plant Badila, but only to a limited extent. *Pests*.—White ants were noticed doing minor damage mostly adjoining headlands on a number of local farms, and generally in the vicinity of dead timber. Borers had also done slight damage in many places, generally near a main drain.

### BOWEN.

Very little cane is now being grown here, fruit and vegetables being the main products. The small tonnage harvested this year, however, gave better density returns than in past years. Some very good Badila in particular, as well as N.G. 24 B (green Goru), were seen. Inquiries were made for E.K. 28 for plants for next year, so it is probable that a little extra may be planted either this year or early in 1928.

### MACKAY.

As only a few days were spent in this district, very few farms were inspected, and these few only in the vicinity of Racecourse Mill. This mill was crushing splendidly, averaging about 4,200 tons week after week, and showing an average c.c.s. for the season of a shade under 15.0. Crushing had been greatly facilitated by the fresh state of the cane hauled along the recently completed Homebush tramway. In the limited time at my disposal, some remarkably nice plant cane was seen, mostly looking green and healthy and in a fair state of cultivation.

### Varieties.

H.Q. 126 (Clark's Seedling), Q. 813, N.G. 15 (Badila), Malagache, E.K. 28, 7 R. 428 (Pompey), M. 1900 are the most popular hereabouts, with Q. 813, H.Q. 426, and M. 1900 the chief favourites. Of these, Q. 813 certainly seems the most suitable on account of its being so free from disease, its good striking qualities, and rapid growth. H.Q. 126, unfortunately, is very liable to disease, as mentioned hereafter. M. 1900 is a very good cane to cut late, but wants watching for Red Rot. E.K. 28 is giving very good returns locally, and is liable to become more popular. It is also a late cane. Pompey (7 R. 428) upon suitable ground gives good results, and is also a late cane to harvest. Badila upon the rich deep flats is easily the most suitable cane, both for tonnage and density.



**Diseases.**

Red Rot in H.Q. 426 plant and ratoons and M. 1900 plant and ratoons was noticed to be doing a great deal of damage, being responsible for losses in weight and also in c.c.s. The dangers of this disease have already been outlined very comprehensively by Mr. E. J. F. Wood (Assistant Pathologist), and control measures suggested, and growers are advised to give these measures a trial, otherwise the disease is certain to spread.

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*The Northern Field Assistant, Mr. A. P. Gibson, reports for the month of October:—*

**BABINDA.**

Rain and sunshine alternated. The former replenished the water supply, freshened the vegetation, and swathed the wonderful background of mountain beauty in a dripping blanket of mist.

**Rainfall.**

August, 1 point; total recorded for September, 397 points; that for the year has been 143.65 inches. Over 18 inches has fallen since the mill commenced crushing.

**The Crop.**

The cane had lost the beautiful dark-green appearance which generally denotes speedy growth. The drier and cooler conditions experienced had assisted in its removal, but had retarded its growth. Some growers appeared to be disappointed because of the poor and patchy nature of some fields. Such alternating conditions were due probably to one or more of the following conditions:—(a) Late harvesting; (b) inferior drainage coupled with early grub destruction; (c) improper and insufficient tilling. The crop is cutting quite up to early expectations, and the estimate of 190,000 tons remains unchanged.

**Harvesting and Milling.**

The cane supply is being well maintained and good progress is being made. The mill continues to run smoothly and well, turning out some 1,000 tons sugar weekly. It is working a greater number of hours weekly. This appears to be a judicious move, more especially when a factory is faced with overmuch seasonal cane. Some of the benefits are as follows:—(1) The period of crushing is shortened; (2) the subsequent crop is benefited thereby; (3) a greater percentage of the crop is milled when the cane possesses its maximum amount of sugar, therefore more sugar is made. Against this, of course, is the payment of much factory overtime. 105,000 tons of cane had been milled, and the percentage of burnt cane is gradually increasing. The average crop quality is exceptionally high, the greatest weekly c.c.s. being 16.12 per cent. This is the highest since the inception of the mill. It seems obvious that the factory must carry on into January to treat the matured cane still offering, in spite of the increased number of hours crushing.

**Ratooning and Cultivation.**

The unusually long stretch of rainless weather that prevailed till quite recently enabled most farmers to do more and better field work. This has been of great advantage in promoting the growth of the new crop as well as assisting to conserve the soil moisture. Ratooning is too frequently delayed; improved returns would be obtained by performing this important and necessary work as soon as practicable after trash burning. This serious fault is too general.

**Varieties.**

Three main sorts are grown—Badila, still the king of its kind under the northern sun and one suitably raised in the better lands; H.Q. 426, our best medium land cane and leader in the field so far as sugar is concerned. (We are afraid to recommend overmuch of this being grown owing to its great susceptibility to most diseases. This variety, however, is too valuable to lose, for, if lost, the industry would be much the poorer, therefore it behoves our farmers to devote more care when selecting seed. This alone will save it from possible extinction). The Goru canes could easily be discarded; they are only fair in sugar, and are now highly diseased. Q. 813, Oramboo, Korpi, and some E.K. 28 may be grown with profit, on selected soils.

### BARTLE FRERE.

Another fine crop has been raised in the shade of Bartle Frere, Queensland's highest mountain. Canes produced on such Northern volcanic porous upland red soils generally mature more slowly than do those grown on the alluvial deposits. Some wondrously rich soil was noted at South Russell. This rather narrow stretch of land extends some 2 miles along the picturesque Russell River and is sandwiched between it and a great swamp. Leaf Scald is much too prevalent here. Farmers are urged to procure a stock of disease-free cane for their next planting.

#### Plant Cane.

There is a big area of plant cane. Generally, the cane had germinated favourably, and had been freshened by some rain. Planting cane in roughly made drills run out between unploughed exhausted stubbles is bad, and must finally end in disaster. My attention was drawn to a Badila seedling said to have self-germinated in a flower-pot; three plants were obtained, and these were planted on the headland of a Badila field. No difference between it and Badila could be detected by the writer, save that it had stooled wonderfully well and was outstanding in growth.

#### Pests and Diseases.

Where a crop is wholly carried on from cuttings there may be a rapid spread of pests and diseases, also a gradual weakening unless the greatest care is exercised when plant-selecting. Grub destruction is severe on crops growing in a salient of volcanic porous red soil jutting into the granitic kind at Bellenden-Ker, also on similar land met with over the Russell River. Weevil borer damage is acute in parts; the tachinid fly, its valued parasite, appears well established. Big moth and the Tineid moth borer were noted; their presence may easily be detected by dead hearts; the larvæ make one or more holes in the shoot about ground level and sever the leaf arrow at the base. Leaf Scald is the principal disease. This was found mainly in Goru, H.Q. 426, and to a lesser degree in Badila. The characteristics of this are much in evidence in most fields seen, and seem to vary according to variety. Unfortunately, this continues to spread, through ignorance and the want of understanding of the great importance of systematic selection of plants. We can, however, only point out such diseases, and at all times urge our farmers to do better things.

### MOSSMAN.

#### Weather.

Bright and cloudy days and some patchy rain were experienced. A good fall of rain is urgently needed to replenish the dried creeks and freshen the now very parched vegetation. Rainfall to 12th October: Mossman, 67.00 inches; Mowbray, 53.29 inches. August, the very dry month, was of untold benefit; it was mainly responsible for bringing the 1927 crop to maturity early, also hurrying along the harvesting and cultural operations.

#### The Crop.

The sugar lands are scattered, and in parts vary much in quality; with judicious tilling and manuring, followed by more thoughtful plant selection, they could possibly be made to yield a higher tonnage. It seems very evident that the assigned cane area cannot produce cane enough for the mills' seasonal requirements. Early in the year the crop prospects appeared most promising, though the area to cut was known to be some 300 acres less. Generally, it was thought the tonnage to crush would not fall far short of that milled in 1926. Heavy wind and flood damage followed; this, coupled with dry weather periods and much pest destruction, had reduced the early crop forecast of 82,000 tons to 72,000. One redeeming feature, however, is the good mill work and the phenomenal quality of the crop. Many hundreds of people depend on this mill for their living.

#### Harvesting and Milling.

There appeared more harmony between employee and employer, and increased efficiency in field and factory. Practically all the cane is burnt prior to its harvesting; this improper practice results in untold all-round losses. Cane enough to keep the harvesters engaged for two days is burned. This is supposed to be fired between 6 p.m. and 6 a.m. It is truly difficult to accurately estimate the amount required; this, combined with fire getting out of control, frequently results in overmuch being burned. The mill average c.c.s. has been surprisingly high. The cane appeared to have reached the peak of quality about the end of September. It is indeed refreshing



to note the general improvement in the condition of harvested cane and crop transportation. Rapidity in removing harvested cane from field to mill cannot be underestimated. The factory has 25 miles of portable rails. During the slack season two bridges and some 28 chains of a 30-lb line were constructed. Upwards of fifty truck wagons are used for transporting cane from field to permanent way. The weather has been ideal for their use. Forty-five thousand tons of cane had been milled to the 11th October; 27,000 yet remained. The factory is crushing about 4,700 tons weekly, and making upwards of 700 tons sugar. This quantity is removed as soon as bagged to Port Douglas, from whence it is shipped to Cairns.

### Varieties.

Many varieties are raised. The more important are mentioned below. The area truly cannot be classified as being a Badila-growing one, yet more might be successfully grown. H.Q. 426 is highly favoured and one difficult to replace. Less D. 1135 and B. 147 might be grown and the planting of more Q. 813, Oramboo, Korpi, and possibly E.K. 28. H.Q. 285 has been recommended in my previous reports as being a kind suitable for this area. E.K. 28 requires studying, especially the time of planting and its cutting. Great disappointment prevails here because of the exceptionally poor strike. Too early planting, too much soil covering, and apparently poor seed used may have been responsible for its great failure. Many a promising variety has been lost to the industry because its little peculiarities were not understood. Try Pompey in the poorest of soil in a small way first of all; it should do better here than further south.

This district is much troubled with Leaf Stripe disease. Do not plant any more Goru at Mossman; that seen is badly diseased with Leaf Scald.

### Cultivation.

Field work is decidedly better. There, however, is still much room for improvement. Farmers generally devote more time to cultivating the plant part of the crop, but too frequently neglect the ratoons. Fields that had been harvested some six or eight weeks back had not been worked since. The lack of timely cultivation is responsible for loss of soil moisture and poorer crops. When the cane is cut, most of the old roots perish, then is the time to ratoon; if delayed, the new roots are severed and the crop growth naturally is retarded.

### Ratooning.

The common practice is to plough away from the cane row and the rough sometimes levelled by a roller. When overmuch rain falls the left side channels drain the excess water. In a dry time the whole field should be levelled; this considerably reduces the surface area exposed.

### Diseases and Pests.

The wide distribution of diseases and pests is the result of uncontrolled district importations which have and are still taking place, but to a lesser degree.

Leaf Stripe is the main disease, and is found mainly in B. 147, D. 1135, and to a lesser degree in H.Q. 426 and Badila. To control this disease I can only recommend the following:—

- (a) Better plant selection.
- (b) Dig out affected stools in less-infected areas.
- (c) Plough out severely diseased fields as soon as possible.
- (d) Important—See that none of the old stubble remains prior to planting.
- (e) Rotation. Plant with leguminous crop after ploughing out.
- (f) Plant with a resistant variety change.
- (g) Do not use tops from diseased fields for feed purposes.

Leaf Scald was noted on many fields. Army worms and similar moth borers to those found at Babinda were noted. Grub and rat destruction was great in parts.

### MOWBRAY AREA.

Land of quality is found adjacent to the river and lesser creeks which water and drain it. Badila is the cane generally grown. Unfortunately, the spot is rather a dry one, and the crops raised, although excellent in quality, are backward. Good water, it is said, is easily obtained. This being so, irrigation might be successfully conducted. The cane seen appeared disease-free.

*The Southern Field Assistant, Mr. J. C. Murray, reports on the period from 10th September to 12th October:—*

### BUNDABERG.

In the course of the month work was carried out in the Bundaberg and Nambour districts. Control work in connection with Fiji disease was also done. The cane-growers in the counties of Canning, Ward, March, and Stanley are reminded that no plants may be transferred from one farm to another without the permission of an inspector under the Diseases in Plants Act. Growers requiring permits are requested to get in touch with the Director, Bureau of Sugar Experiment Stations, Brisbane.

### Farming Efficiency.

The crushing at Bundaberg was in full swing, with a tonnage per acre slightly in excess of what was estimated at the beginning of the season. The c.c.s. content of the cane is fairly high. A good class of labour is available, guided by a staff of efficient and well-trained industrial leaders.

Much has been said of late about efficiency. While the highest standard of efficiency in our cane industry is desirable, it is also necessary to know what constitutes efficiency, before using the term in a general sense. Many men in selecting an institution as an example of efficiency, or otherwise, really could not explain themselves if they were asked to give logical details in support of their statements.

In the particular phase of efficiency that it is desirable here to discuss—farming efficiency—much depends in endeavouring to obtain the maximum on the financial status of the farmer. The average canegrower is an intelligent man who is keen on regarding his industry as a highly organised business, but in too many instances he is in the struggle to make ends meet, handicapped by lack of capital. He may, superficially, appear to draw away from the breadline, but the financial institution and credit-extending business could tell a different tale.

Leaving the matter of potential efficiency, the details that contribute to better results will be discussed in their relation to the Bundaberg district.

### Ploughing.

In the area under review this section of field work is being done thoroughly and scientifically. Tractors and modern ploughs are in use, also subsoilers and rotary cultivators. Extensive subsoiling is done when there is strong tractor power.

### Planting.

Various types of planters are in use, the smaller growers using the horse implements, while the plantations are using double drillers and planters. The cane is being planted on an average of 8 inches deep with about 3 inches of covering. The writer is of the opinion that the average grower covers his plants too much. Nearly everywhere this spring there can be observed farmers relieving their sets. It is one distinct drawback in regard to the planting implement that the amount of covering cannot be controlled. Rain or shine, the same heavy covering goes on. This does not matter greatly in the porous red soils, but it is very important to study the amount of covering in badly drained lands.

### Plant Selection.

Everything a grower does goes for nothing if he cannot obtain good plants. Often a grower, through oversight or lack of conviction, allows affected or poor plants to go to his soil.

It must be borne in mind by every grower that diseases such as Mosaic, Gumming, and Fiji are a serious menace to the industry if not controlled, and it is only by collective effort that they can be kept in check, and the sooner the farmer who poots the likelihood of disease decimating his crop realises his foolishness the better. The soundest recommendations that the whole field of science can furnish have been presented to the Queensland sugar-growers from time to time on disease control, and it is in their own interests to apply those recommendations.

### Fertilisation.

The matter of obtaining correctly balanced fertilisers is receiving careful attention by the growers as a body. Many are trying local experiments, and all farmers are urged to make trials. What might be termed decentralisation of experiment is all-important in manuring the soil; that is to say that Mr. A., of Oakwood,



may obtain results extremely satisfactory to himself, but that they would be of no use to Mr. B, half a mile away at Gochurrum, nor perhaps to the immediate neighbour of A.

### Varieties.

In planting, great care must be taken to select a variety that is proving of the maximum value. In the Woongarra area a great deal of trouble and loss is being caused through gumming disease (*Bacterium vascularum*). Careful study of this serious cane malady has shown that it is caused by growths of microbes within the fibres. It has also been demonstrated that certain canes are more resistant than others to this disease. The most resistant cane to gumming disease at present is the Q. 813. This cane is well known and easily obtained, and although, perhaps, on some soils this cane will not do well, the fact remains that it will produce, on the whole, gum-free canes; therefore the farmers are recommended to grow Q. 813, and the cane inspectors and plantation managers are respectfully asked to assist the Bureau Staff in this recommendation. N.G. 16, N.G. 15, M. 1900 Seedling, and D. 1135 should be left alone for a time, or most carefully selected from areas right outside the Bundaberg district. The attention of canegrowers is drawn to the thorough and careful considerations of Mr. D. S. North, Plant Pathologist to the C.S.R. Company, on gumming disease.

### NAMBOUR.

The heavy rains that fell early in the year were followed by a very dry spell, then a succession of winter frosts, and upon the heels of the frost about 6 inches of rain. It can be observed then that the year has not been favourable for the growth of crops. Nevertheless the c.c.s. value of the cane is high, and the mill management reports no set-backs from gummed cane. The latter highly satisfactory state can probably be attributed to two causes—(1) extensive planting of Q. 813 and (2) more careful plant selection.

The cane that has just been planted is going to have a slow time owing to the abnormally heavy rain soaking the soil, but it appears to be germinating well, as a careful survey of several planted areas showed.

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*The Southern Field Officer, Mr. J. C. Murray, reports for the period 14th October to 12th November:—*

### NAMBOUR.

The last report on field work was written from Nambour. A complete survey of the district had not been made at the time, so that it will be necessary to set down notes made after writing the last report.

Every effort is being made to encourage the growers to make local experiments with varieties and manures. If each farmer could make a small experiment plot on his farm, devoting, say, an acre to the work, he would find that the information gained in relation to fertilising alone would pay him over and over again for his trouble. Each crop taken from the land does away with some of the plant food in the soil. How to feed that soil properly and prevent complete wastage can only be determined by local experiment.

The following are details noted in the sub-areas:—

### Coolum.

Cane varieties growing here include Q. 813, Q. 970, Q. 1098, D. 1135, and N.G. 15. The farmers generally consider that the first-named is the best of these. As is well known in the Coolum area, drainage is the most serious problem facing the growers. The writer understands there is a comprehensive scheme afoot at the present time for the purpose of effectively draining the Coolum farms, and if this is brought to maturity then some fine canegrowing land will be at the disposal of the farmers, who, up till now, have had an up-hill fight in this particular district.

### Maroochy River.

Many of the agricultural troubles encountered this year have been caused by unfavourable weather early in the year. However, good tillage has greatly improved matters, and just at present the young plant and ratoon crops look well.

The principal enemy the farmers in this area have to combat is the ever-present gumming disease. It is almost impossible to completely rid the canefields of this serious menace, but by growing resistant varieties and carefully selecting plants the malady may be prevented from doing serious damage. Farmers looking for information on gumming disease (and they always should be) are asked to write to the Director of Sugar Experiment Stations, or ask the visiting officer as many questions as they can think of.

When the writer was on the Maroochy River, two years ago, at a field day held there in connection with gumming disease, he recommended the farmers to plant Q. 813 and try as extensively as possible H. 227. This recommendation is repeated here. The first-named variety proved its resistance to gum and the latter is also showing resistance to a fair degree.

The resistant variety of all the matters named in connection with disease control is the best, and the position in disease-affected areas will keep getting worse and worse if farmers keep on casually planting Badila, D. 1135, and M. 1900 Seedling.

Great progress has been made on the Maroochy River over the last eight years. New farms have been made where tea-tree swamps were previously, nice homes have been built, roads improved, and tramways extended. The farmers have not really made any money, but they have faith in their district and the measure of comfort is due to careful ways and hard toil.

### MARY VALLEY.

Fairly heavy crops have been grown here this year, although the c.e.s. value has, on the whole, been low. Taking this and long haulage into consideration the growers have not done very well.

Varieties growing are Q. 813, M. 1900, D. 1135, and Badila. H.Q. 285 is also making good growth. Farmers are recommended to grow principally Q. 813 and H.Q. 285. The cane in this district is healthy and free from disease on the whole.

Growers here are reminded that at Bundaberg Sugar Experiment Station they can have tests made of their cane as a guide to maturity only.

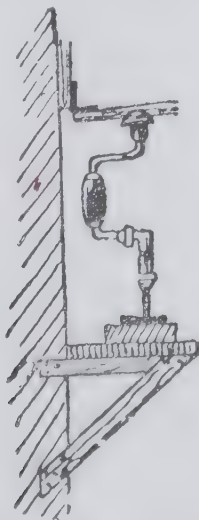
### BUNDABERG.

Conditions here could be summarised as under:—Germination: Fair; misses due to diseased plants and unfavourable soil conditions. Weed growth: Heavy, though not out of hand. Fertilising: Methods more satisfactory; more local experiment being undertaken. Cane varieties: Position serious through the majority being very susceptible to gumming. Diseases: Gum (*Bacterium vascularum*) very bad.

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### A TEMPORARY DRILL.

Recently it was necessary to drill holes in metal hinges with long flanges. To do this with only a hand brace and bit is a difficult job, as the drill required considerable pressure to make it bite. The device illustrated was fixed to a post,



and acted very well. A board was nailed to the post with a hinged arm, while below at the right height was a bracket to carry a small table or shelf. The leverage obtained was sufficient to drill holes easily.



## ROOT KNOT OR NEMATODE ROOT GALL.

By ROBERT VEITCH, B.Sc., Chief Entomologist.

Nematodes or eelworms belonging to the species *Heterodera radicola* are responsible for the development of the peculiar malformations occurring in root knot or nematode root gall. These extremely minute animals are found in enormous numbers in the soil in many districts in this State, and records of their destructive activities have been obtained from centres as far apart as Cairns and Coolangatta. The list of economic and other plants attacked by them is a very formidable one, and their presence in the root system is frequently associated with disastrous consequences to the plants attacked. It therefore seems desirable to give a brief account of these destructive organisms and to indicate lines along which some measure of relief may be obtained.

### Appearance of Infested Plants.

An examination of the root system of infested plants usually yields ample and conclusive evidence of the presence of the parasitic organism. The typical feature in an attack by this species of nematode is the occurrence of extremely swollen or distended areas (Plate 147, Figs. 1 and 2; Plate 148, Figs. 1 and 3) at various points throughout the root system. The swellings or enlargements may be found occurring singly and at considerable intervals on the roots, or, on the other hand, they may be so close to each other as to give practically the whole of the root system a most peculiar and abnormally thickened appearance. These typical swellings are produced as a reaction to the irritation set up by the activities of the nematodes in the root tissue.

It is well to point out at this stage that, in the Leguminosæ or pea and bean family, certain beneficial root nodules are produced by a totally different organism. These nodules result from the presence of the nitrogen-fixing bacteria that are found in association with the root system of the Leguminosæ, and they must be regarded as being entirely beneficial. The root knots or nematode root galls on the other hand are frequently very detrimental to the welfare of the attacked plants.

The beneficial bacterial nodules may be distinguished by the fact that they are generally small or moderate-sized spherical bodies, which can usually be readily broken off from the sides of the rootlets on which they are found (Plate 148, Fig. 4). The root knots or nematode root galls, on the other hand, are swellings in the roots themselves and they are not readily detached therefrom. The difference in appearance between bacterial nodules and the nematode-induced root knots or galls is well indicated in Figs. 1, 3, and 4, Plate 148).

The roots are not invariably the only portion of the plant attacked, because in the case of the ordinary potato the tubers or potatoes are often infested, the whole surface not infrequently being covered with a

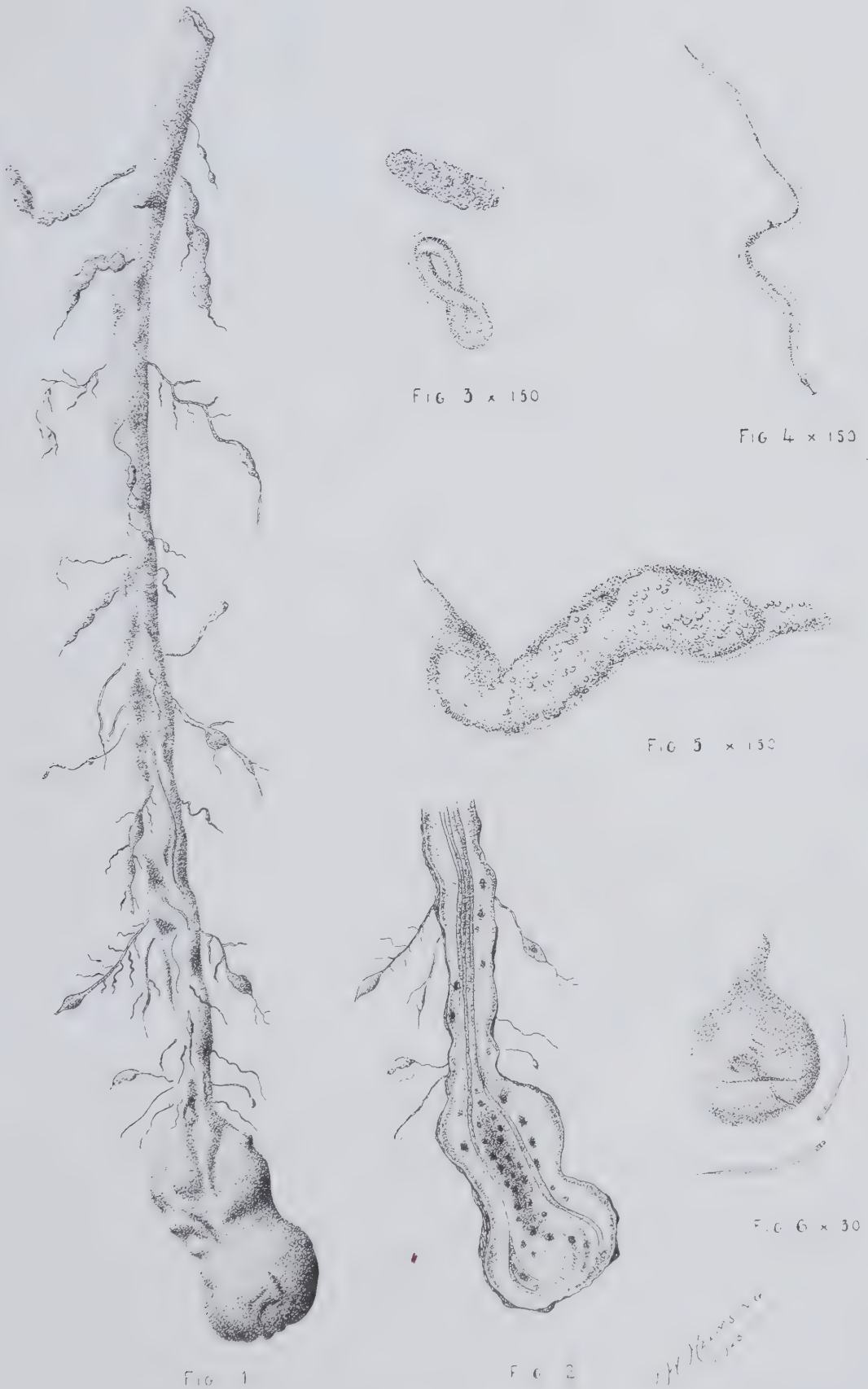


PLATE 147.

- Fig. 1.—Infested Banana root.  
 Fig. 2.—Longitudinal section of Banana root showing Nematode infestation.  
 Fig. 3.—Eggs in different stages of development.  
 Fig. 4.—Larva.  
 Fig. 5.—Female.  
 Fig. 6.—Female (later stage).



series of swellings which give to the potato a characteristic "pimply" appearance (Plate 148, Fig. 2). In addition to the attack on the tubers the roots of the potato may be infested just as in other plants.

### **Effect on Infested Plants.**

The effect that is produced by root-knot infestation varies very materially. Many of the species of plants included in the category of those that are attacked show but little evidence of the infestation in their roots, and, indeed, they appear to suffer little or no injury from the presence of the parasite. Other species of plants frequently show very considerable numbers of root galls on the roots, but, even so, in their case there is no definite evidence of serious damage arising therefrom. The third class is the most important for present purposes, for the species of plants included therein are subject to heavy infestations associated with very severe losses.

The galls that occur in the roots of infested plants belonging to these highly susceptible species disorganise the normal functions of the root system, and, as a consequence, there is very serious interference with the flow of soil moisture absorbed by the delicate roots for transference to the leaves and stalks. Very appreciable dwarfing, in the case of susceptible and severely attacked plants, is associated with that disorganisation in the transport of the raw materials required for the building up of plant tissue. Moreover, during hot dry spells such plants wilt much more readily than those that are uninfested. Infested plants of susceptible species are also generally paler in colour than those that have escaped attack, and they have a somewhat sickly yellowish appearance.

Where infestation is heavy and general conditions are favourable to the parasite, the death of the plant may occur much earlier than would normally be the case. The early collapse of the plant may be due entirely to the nematode infestation, but cognisance must also be taken of another factor—namely, the ease with which fungus or bacterial diseases can gain an entrance through the ruptured root tissues. These diseases may be the actual cause of the death of the plant or they may be merely a minor contributory factor.

### **Extent of Losses.**

It would be very difficult indeed to give any estimate of the losses due to the presence of nematode root-gall infestation in Queensland. Local observations suggest that serious reductions in yield have followed in its wake, but no figures are available to indicate just how heavy these losses have been. Elsewhere, however, losses were estimated in some cases, and it is interesting to quote from these estimates. They indicated a loss of 20 per cent. in beans, 12 per cent. in potatoes, 25 per cent. in peas, 13 per cent. in tomatoes, and about 4 per cent. in cotton. Even a loss of 4 per cent. in a highly important crop such as cotton represents a tremendous wastage if it is a figure that is applicable in most cotton-growing countries and does not represent an abnormally high loss peculiar to the country in which the estimates were made.

### **Organism Responsible for Root Knot.**

As already indicated, the malformations characteristic of root knot or nematode root gall are not due to insect attack, but are the direct result of the infestation of the root tissue by a very small eelworm.

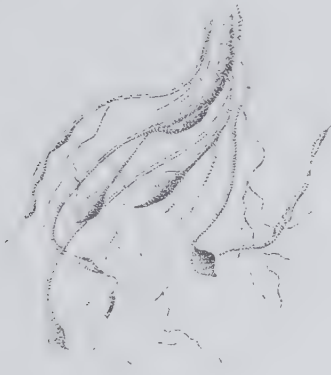


FIG. 1.



FIG. 2



FIG. 3



FIG. 4.

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1927

PLATE 148.

Fig. 1.—Nematode galls on Strawberry roots.

Fig. 2.—Nematode infested Potato.

Fig. 3.—Tomato root infested by Nematodes.

Fig. 4.—Bacterial Nodules on roots of Lupin.

(All  $\frac{1}{2}$  natural size).



Eelworms belong to the group of animals called nematodes because of their thread-like appearance. Some of these eelworms are parasitic on plants, others attack animals, including man himself, while still others are predaceous on individuals belonging to their own group—i.e., other eelworms. The species associated with root knot is *Heterodera radicicola*, a nematode that has a very wide distribution throughout the world.

### Life History of the Root Knot Nematode.

The life history of this species has been worked out in detail elsewhere, but for present purposes the following brief outline is sufficient. The usual male and female sexes occur and the female is credited with the capacity to lay as many as 500 eggs. The eggs are provided with a tough shell, which serves to protect them against adverse conditions that may occur in the soil. They are extremely minute, being not quite  $\frac{1}{30}$  inch in length.

After the usual incubation period, the eggs hatch and an extremely small thread-like animal emerges. This is the larval stage, and at its commencement the eelworm is about four times as long as the egg from which it hatched. The young larval eelworm moves about freely in the soil until it finds a susceptible plant; having succeeded in doing so, it enters one of the roots, generally choosing a spot near the tip of a young feeding root. A spear-like organ inside the mouth is then used for the purpose of feeding on the fluid contents of the tissue of the root entered by the nematode, and as a reaction to its presence the characteristic swellings are produced at the spot invaded.

In the case of the female eelworm growth is in breadth rather than in length, and eventually the female becomes a pear-shaped or flask-shaped body, which can be detected without the aid of a lens when the infested tissue is broken open and examined. The female nematode is then about  $\frac{1}{30}$  inch in breadth and is a somewhat glistening pear-shaped object. The male also feeds in the root tissue, but it does not attain the flask-shaped form of the female; on the contrary, it remains long and worm-like. The various stages in eelworm development are illustrated in Plate 147, Figs. 3, 4, 5, and 6.

Figures are not available to indicate how many generations are passed through in Queensland in the course of twelve months, but, as twelve generations are possible in the Southern United States, there is every reason to believe that in Queensland at least a similar number of generations would be obtained.

### Conditions Favouring Infestation.

Nematode infestation is generally at its maximum in light sandy soils in semi-tropical or tropical regions. The relatively slight variations occurring in the temperature in such areas permit of almost uninterrupted development, and the texture of the soils in question is also highly conducive to the excessive multiplication of soil-infesting nematodes.

Heavy soils are generally much less susceptible to infestation, probably on account of the difficulty experienced by the nematodes in moving from plant to plant in such soils. Where soils are subjected to

repeated flooding and are normally very wet, infestation is slight; on the other hand, if the soil is abnormally dry, infestation is also unimportant.

### **Means of Dissemination.**

It is generally believed that the larval nematodes move through the soil at the rate of only a few feet each year. Such being the case, there must be some means of dissemination other than the mere haphazard wandering of the larval nematodes in search of the roots of susceptible plants.

Seedlings or nursery stock infested with nematodes have frequently been the means of establishing the pest in areas previously free from its ravages. Seed potatoes have been similarly responsible for nematode dissemination, while manure containing portions of the roots of infested plants has also been a factor in their spread.

The rapid dissemination of this pest has been facilitated by the ordinary operations of cultivation; for implements used in infested paddocks can transfer the nematodes to uninfested paddocks through the agency of the soil adhering to their various parts. They may similarly be transported in the soil adhering to the boots of workers or to the hoofs of animals. Drainage, irrigation, or other running water may also serve as a means by which the parasite can be transported.

### **Susceptible Plants.**

The number of species of plants recorded as being attacked by the root knot nematode is now extremely large and is frequently being added to. Many of the most important plants cultivated by man for his own sustenance are included in the category of susceptible plants, and mention must also be made of the fact that many weeds are attacked.

Asparagus, banana, bean, beet, carrot, celery, cotton, cucumber, fig, grape-vine, lettuce, onion, papaw, pea, peach, pineapple, potato, pumpkin, strawberry, sugar beet, sugar-cane, sweet potato, tomato, and watermelon may be mentioned as some of the more important plants subject to severe attack.

### **Plants Resistant to Attack.**

Among the plants that are immune to attack or but slightly affected, mention may be made of barley, broom millet, four varieties of cowpea (Brabham, Iron, Monetta, and Victor), grasses (most), maize, peanut, sorghum, wheat, and velvet beans.

### **Control Measures.**

It will be evident from what has already been written on this subject that the control of the root-knot nematode parasitic on economic plants must of necessity present a very difficult problem. Here the farmer, fruitgrower, or nurseryman is dealing with a parasite that is for most of its life-time entrenched within the living root tissues of the plant to be treated or protected. When not in the plant tissues it is free in the soil, where it frequently occurs in enormous numbers. Further complications are caused by the fact that there are many weeds on which it can exist even if the land is cleared of susceptible cultivated plants.



It may be definitely stated that the cure of infested plants is quite outside the bounds of practicability, and hence control should aim at eliminating or reducing the numbers of nematodes inhabiting the soil where land is already infested. Where it is uninfested, every effort should be made to maintain it in that happy condition.

Nursery stock or seedlings showing any symptoms of root knot should not be planted on uninfested lands, and, indeed, such stock or seedlings are undesirable for planting even on infested lands. Care should also be taken to avoid the use of infested seed potatoes. Mention has already been made of the possibility of infestation by implements, live stock, running water, &c., and accordingly all practicable precautions to eliminate such sources of infestation should be taken. If these precautions are observed, uninfested land may be kept free of this very serious pest.

The fact that quite a number of valuable crops are immune or highly resistant to attack has been used to reduce infestation by means of rotation; a rotation being adopted in which these immune crops feature prominently. The immune or resistant crops were referred to in an earlier paragraph, and consideration might be given to the growth of certain of these crops where it is desired to reduce nematode infestation in order to permit of the subsequent growth of susceptible crops. The actual crop selected for the rotation would, of course, depend on many factors that cannot be entered into in these notes.

Infested greenhouses or seed-beds can be treated by methods that would be much too expensive on a field scale, and in this connection mention may be made of the fact that steam sterilisation of the soil in greenhouses is regularly carried out in many large establishments throughout the world. In cases where sterilisation is desired but steam is not available, much good may be effected by treating pots or other containers and their soil contents with boiling water at the rate of five gallons per cubic foot. After treatment, several days should be allowed to elapse before planting, in order to permit of the soil draining in a thoroughly satisfactory manner.

Even where infestation is present, susceptible plants may sometimes be kept on quite a profitable basis by a judicious combination of thorough cultivation and heavy manuring.

During recent years much experimental work has been devoted to an endeavour to control nematodes on a field scale by soil fumigation. However, so far as Queensland conditions are concerned no data are yet available to show that such is both economically practicable and effective.

#### AN INTERESTED READER.

*An old Coolabunia subscriber, now settled at Mulgeldie, in the Upper Burnett, writes:—“ . . . I am very interested in the ‘Queensland Agricultural Journal,’ for it is the best periodical for the farmer . . . and I am willing to continue getting it as long as I can read. . . .”*

# THE CORN EAR WORM ON TOMATOES.

By ROBERT VEITCH, B.Sc., Chief Entomologist.

The insect known as the corn ear worm (*Heliothis obsoleta* Fabr.) is an extremely serious pest of many economic plants, but, as its popular name implies, it has gained particular notoriety as an enemy of corn or maize. It is one of the most destructive insects associated with cotton in Queensland, and it is also undoubtedly the worst insect pest of the tomato in this State. When associated with the lastmentioned plant it is generally referred to as the tomato caterpillar or "worm." For present purposes attention will be devoted solely to its activities as a pest of the tomato.

The corn ear worm is notorious not only on account of its very wide range of food plants but also because of the fact that it has been found to occur in many different countries, and is, in fact, practically cosmopolitan. It belongs to the family of moths known as the Noctuidæ, and is therefore allied to the very destructive species commonly referred to as cutworms and army worms.

## Life-cycle Stages.

(See Plate facing p. 591 in "Cotton Growing in Queensland," Part II., this issue.)

The various changes through which this insect passes to maturity are typical of all moths, there being four very distinct and easily recognisable stages in its development—(1) egg, (2) larva or caterpillar, (3) pupa or chrysalis, (4) imago or adult or moth.

The eggs (Plate I., Fig. 1) when just laid are pearly-white in colour, but as the incubation period advances they darken very appreciably. Their shape somewhat resembles that of a dome, and in size they are about equivalent to that of half an ordinary pinhead.

The larvæ (Plate I., Fig. 2) are whitish when newly emerged from the eggs, but their colour soon changes, and in full-grown specimens it varies very greatly, some being pale-green, whereas others are dark-brown. A number of longitudinal stripes of different shades usually play a part in the formation of the colour scheme. The larvæ have three pairs of jointed legs on the thoracic segments and five pairs of unjointed abdominal and caudal legs; when full grown they measure about  $1\frac{1}{2}$  in. in length.

The pupæ (Plate I., Fig. 3) are of the usual lepidopterous type, being brown in colour and measuring about  $\frac{3}{4}$  in. in length.

The moths or imagines (Plate I., Fig. 4) possess two pairs of wings, giving a maximum wing expanse of about  $1\frac{1}{2}$  in. The colour pattern is sufficiently detailed in the accompanying plate (Plate I., Fig. 4), and hence a written description thereof is unnecessary.

## Life History and Habits.

The female moth, after mating, generally lays her eggs singly on the flowers, flower buds, or on the young foliage, thus ensuring that the larvæ, on emergence, will have an abundant supply of suitable food close at hand. Eggs may, however, be laid on other parts of the plant.

The number of eggs laid is generally regarded as being in the vicinity of 1,000, although as many as 3,000 have been recorded. Egg-laying is spread over a number of nights. The incubation period of



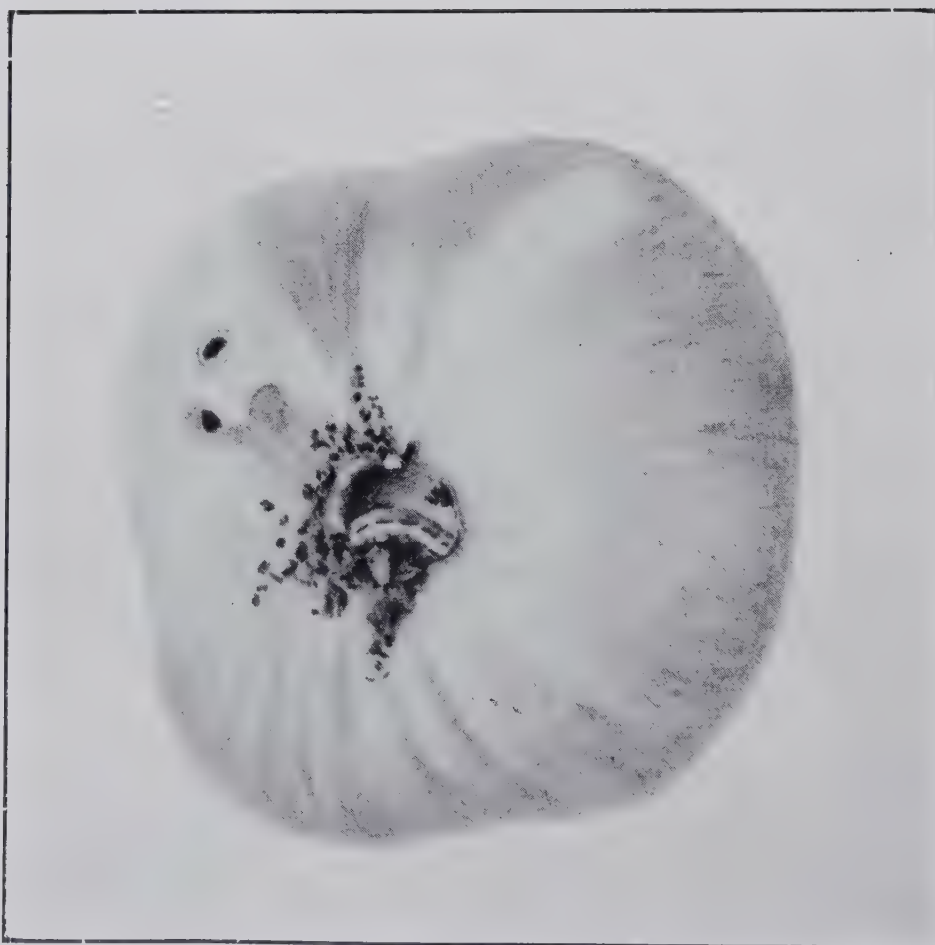


PLATE 149.—TOMATOES ATTACKED BY CORN EAR WORM LARVAE.  
(From water-colour drawing by I. W. Helmsing.)

the eggs in the summer months is about three days, but in spring time six days or even longer may be spent in the egg stage.

The newly-emerged caterpillars eat the eggshells and then turn their attention to the flowers, foliage, or fruit of the plants on which they occur. The caterpillars may continue feeding on the foliage, but usually they make for the green fruit. The most destructive feature of their feeding activities is the attack on the fruit, which they enter at the calyx end (Plate 149). Each fruit within which a larvæ is feeding is rendered useless, and as the larva attacks fruit after fruit, each individual is capable of destroying a considerable quantity of tomatoes in the course of its short larval life. The injury in cases where the larva does not feed within the fruit is much less serious, and the tomatoes so attacked are not necessarily rendered useless. In bad outbreaks 50 per cent. or more of the fruit may be destroyed, and, unfortunately, infestation is not confined to the coast, for losses also occur in the Stanthorpe district. The caterpillars grow rapidly, and moult six times before becoming full grown. Full size is attained in two or three weeks, and then the insect passes on to the third stage in its life-cycle—namely, the pupa.

The full-grown caterpillar drops to the ground and burrows into the soil to a depth of a few inches. It then forms a small earthen cell inside which it changes to the pupa. In the pupal stage a tremendous transformation takes place, and a complete reorganisation of the body contents results in the production of the moth or reproductive stage of the insect. The pupal stage generally occupies ten days or a fortnight in the warmer weather, but in cold weather the time necessary for the completion of that portion of the life-cycle may be greatly prolonged. No feeding takes place in the pupal stage.

At the end of the pupal stage the moth emerges from the earthen pupal cell and works its way out of the soil through a channel constructed by the larva prior to pupation. It then mates, lays eggs, and so the life-cycle is continued. The moth is generally considered to live for a period of about two weeks. It is nocturnal in its habits, but may occasionally be seen in the day time. It feeds on the honey of flowers, and is in itself responsible for no damage to tomatoes. The whole life-cycle from the laying of the egg to the emergence of the moth occupies from four to six weeks for the spring and summer generations in Queensland.

### Natural Enemies.

Quite a number of natural enemies attack the corn ear worm, but, unfortunately, they do not exert their maximum influence until summer is well advanced, and, accordingly, the tomato-grower cannot depend on them for complete control. He must, therefore, supplement the natural control factors by artificial control measures.

The eggs are attacked by three very small wasps, *Trichogramma australicum*, *Trichogramma rara*, and *Neoteleonomus* sp. A small bug, *Triphleps australis*, also does good work by sucking the contents of the eggs and thus destroying them.

The larvæ are parasitized by four enemies, and two predatory wasps also serve to reduce their numbers.

Insectivorous birds, adverse weather conditions, and diseases also play a part in reducing the corn ear worm population.



### Control Measures.

The fact that this pest has a wide range of plants on which it can complete its development suggests that, as one control measure, attention should be paid to other host plants growing in the vicinity of the tomatoes. If these alternative host plants are grown neither for profit nor for domestic use, and are neglected, they will serve merely as excellent breeding-grounds for the pest. They should therefore be destroyed. Should they be grown either for home consumption or for marketing, then they should be subject to suitable control measures that will keep them free from the corn ear worm. Included in the alternative host plants are maize, cotton, lucerne, tobacco, cowpea, bean, pea, cape gooseberry, and rosella.

Tomatoes that have been attacked by this pest should be collected and disposed of by deep burying or by boiling, or by any other suitable measure that will serve to destroy the caterpillars associated with them. In this way a check may be placed on the unduly large multiplication of the later generations.

Rotation is another important measure that may afford some relief from infestation, and if it is practicable to do so it is well to plant tomatoes after a crop that is not susceptible to attack by the corn ear worm. If that is done the tomatoes will get a cleaner start than would otherwise be the case.

Thorough cultivation in preparation for planting up will lead to the destruction of many of the larvæ and pupæ of this pest either by direct mechanical injury or by the exposure of these stages to adverse climatic conditions, and to the attacks of predatory enemies such as birds.

Spraying or dusting with arsenate of lead is regularly practised in many districts in Queensland for the control of the corn ear worm on tomatoes, and much benefit is usually derived from this control measure. The crop must be treated several times at somewhat frequent intervals, the applications commencing not later than the date at which the first fruit appears. Careful observations leading to the detection of heavy egg-laying by the moths will frequently indicate the most appropriate times at which to spray or dust.

Dusting is carried out with a dust gun, and is dependent on suitable atmospheric conditions for success. It should be attempted only when there is little or no wind blowing, and is best undertaken when the dew is still on the plants early in the day. Various brands of dusts are on the market, and some of these have been specially prepared for application to tomatoes. Fruit that has been sprayed or dusted should be cleaned before packing.

#### SHOULD BE IN EVERY PRODUCER'S HOME.

*Thus a Peehey (Crow's Nest Line) farmer when renewing his Journal subscription for five years:—"I might add that I find the Journal of great value to me, and I cannot understand why it is not to be found in every primary producer's home."*

# COTTON GROWING IN QUEENSLAND.

## PART II.

### Pests of Cotton in Queensland.

A Bulletin for farmers giving an account of the Insect Pests of Cotton and their habits, and some measures for controlling them.

By

E. BALLARD, B.A., F.E.S.

Commonwealth Cotton Entomologist.

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#### FOREWORD.

In publishing this short account of the chief cotton pests of Queensland, the author is conscious that there are many shortcomings, notably in the direction of remedies for controlling the insects which levy their toll year by year.

The pests of cotton in most cotton-growing countries follow very much the same lines, and in other lands remedies have been used which might be applicable to Queensland, on the other hand they might not.

Where any definite remedy is recommended in the following pages, the cotton-grower may rest assured that it has been tried under Queensland conditions and found to be successful and economical enough to be used.

The Corn Ear Worm commits the most <sup>\*</sup>spectacular damage, and in the case of this insect the forms of control have been proved on too many occasions for their efficacy to be doubted.

If in the case of some of the other pests remedies are for the moment lacking, it is an advantage to know who one's enemy is even when one cannot at the moment defeat him.

It is hoped that the cotton farmers will take the trouble to acquaint themselves with the insects that live on and in their cotton, so that in the first place they may be able to take attacks at the beginning and so more easily combat them, and secondly they will avoid sleepless nights caused by the appearance of some perfectly harmless insect.

A fruit farmer to be successful has to be something of an entomologist, and the cotton farmer should follow his example.

It would be easy to give many instances of innocent insects accused of damage and dangerous ones given unblemished characters, but it is hoped that this bulletin will help to make it increasingly difficult for the guilty to escape.



## INTRODUCTORY.

The problems attending the production of a crop of cotton cannot be separated from those arising from the activities of insect pests, and the measures to be taken to avoid losses are as much a part of good farming as the proper preparation of a seed-bed or cultivation of the growing plants.

Next to a sufficient rainfall and suitable soil, insects play the chief part in deciding whether a farmer will harvest a crop of cotton or not.

This does not mean that Queensland suffers more from insect pests than other cotton-growing countries. It must be realised, however, that insects are a constant menace and precaution must be taken to defeat them.

Large numbers of different species of insects take their toll of the cotton plant. Some attack the stem, some the leaves, some the bolls and squares. Fortunately the great majority make little or no impression on the crop and can be disregarded. Certainly, except in special cases, it is not an economic proposition to use insecticides against them.

Of those which are of importance some only occur sporadically, others are of annual occurrence.

An outline of the life histories of these is given below as it is essential to know something about them before the measures which should be taken against them can be understood.

## MAJOR PESTS OF COTTON.

### (A) Pests of Annual Occurrence.

These pests are confined to those which attack the bolls (and the seeds therein), squares, and flowers, or all three. They are, further, either caterpillars, or grubs as they are more usually termed locally, or sucking insects.

Of the former the most important is—

### THE CORN EAR WORM.<sup>3</sup>

(Plate I.)

This insect is by no means peculiar to Australia, being found all over the world, and often though not always as a pest of cotton, as it has a very large number of other food plants.

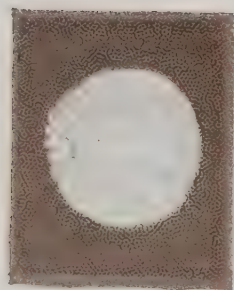
The Corn Ear Worm, in the form in which it is most familiar to the farmer who sees it eating off squares and boring into bolls, is about

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<sup>3</sup> *Heliothis obsoleta* Fab. Known to some farmers as the Maize Grub. It has been decided to adopt the American common name so as to avoid confusion with *Conogethes punctiferalis*.







I. W. Helmsing. 1926.

1½ in. in length and of variable colouring—green, green with longitudinal stripes of a paler green, sometimes brown, sometimes a dark green and black. The colour schemes are numerous. It is often stated that it attacks a crop suddenly, overnight as it were.

Although it will sometimes migrate, such sudden appearances very seldom occur. What actually happens is that the grubs pass unnoticed until the peak of their attack is reached and the worst damage done.

#### LIFE HISTORY.

The life history of the grub is briefly as follows:—

The parent is a moth (Plate I., Fig. 4) with greenish grey or yellowish fore wings measuring 1½ in. across the outstretched wings. The hind wings have a deep, dark-brown border. The female moth after pairing proceeds to lay her eggs one at a time on the cotton plant, only a few on each plant, always near the top. In this way the young larva is assured of tender food. The moth can lay up to 1,000 eggs. They are not all laid the same night, but egg-laying takes place in bursts spread over several days.

#### THE EGG.

(Plate I., Fig. 1.)

When first laid the eggs are small white objects, and once familiar with them they are very easily seen. After the first twenty-four hours the eggs begin to change colour, and just before hatching, which takes place in two and a-half to three days in the summer, they are orange yellow.

#### THE GRUB.

(Plate I., Fig. 2.)

From them emerge a tiny grub, which first eats the egg-shells and then wanders into the terminal bud and feeds on the young tender leaves. As they get older they attack the squares, which, being hollowed out, are shed.

This is the first symptom of Corn Ear Worm attack, which is often overlooked, the square-shedding being attributed to the weather or other causes. The grubs cast their skins six times (in the summer every two to three days), and after the sixth moult are ready for the next stage, the pupa.

#### PUPA.

(Plate I., Fig. 3.)

This stage is passed in the soil usually close to the plant. The grub drops to the ground and burrows down for about 1 in. to 1½ in., and there makes a small cell. Here it turns into a pupa (Fig. 3), and from nine to eighteen days after burrowing the moth emerges and begins laying (if a female) in some three or four days' time. So the whole cycle starts again—Egg, two and a-half to three days; grub, fourteen to twenty-one days; pupa, nine to eighteen days. The moth lives about fourteen days, laying most of the time. Life from egg to egg, twenty-nine and a-half to forty-two days for the summer and spring broods.



If each female lays an average of 500 eggs, and all hatch, and half are females, the descendants of one moth will reach 125,000 in under two months. Fortunately all eggs do not mature, for reasons to be given hereafter.

### HABITS.

The grub, as has been stated above, starts feeding in the young leaves which are just unfolding. It soon starts on the squares and destroys numbers of them, not by eating them all, but by eating holes in them, sometimes smaller, sometimes larger.

Any damage to a square even if quite slight results in its being shed. If the cotton plant is engaged in putting on its first squares when the numbers of Corn Ear Worms are at their greatest, then the squares and flowers are eaten as fast as they are formed, and as a result the plant sets no or very few bolls, and puts on only vegetative growth. This is what very frequently happens in the case of late-planted cotton, and accounts for the big losses to cotton farmers in the 1923-24 season, when most of the cotton in the State was late-planted owing to the dry spring of 1923.

The maximum attack develops about the first week in January to the middle or end of February. After this time the attack begins to die off as the grub's natural enemies begin to make themselves felt, and with cooler weather the life cycle is prolonged. Behind the coastal ranges where frosts are experienced, and where the chief cotton-growing areas will be, May sees the last of the Corn Ear Worm as it descends into the soil and there passes the winter. Moths of the spring generation probably begin to emerge in September, but no large population is bred up until late December or the New Year. When grubs are in their fifth and sixth stages they often attack full-grown bolls, and from their habits of wandering do a good deal of damage in this way.

If they simply stayed in one boll and consumed it, it would not matter so much, but they often eat through one lock and then leave, and the damaged lock is attacked by moulds which may ruin the whole boll. This is never so serious as eating the early squares, because a damaged boll may still yield some cotton, while if squares are eaten as they appear the plant tends to put on only vegetative growth and no bolls are produced at all.

Early-planted cotton has set so many squares and bolls by the time the Corn Ear Worm population is large that it can afford to lose a lot of them. As many as 60 per cent. can be lost and still yield a profitable crop. The square formation always manages to keep ahead of the grub. So far as we know at present, the latest date for sowing which will enable the crop to escape serious damage from Corn Ear Worm seems to be the middle of October.

It might so happen that an early planted crop is an impossibility through failure of winter and spring rains. When this is the case, special precautions have to be taken.

## REMEDIES.

These are of two kinds—firstly, by use of a trap crop, that is a crop more attractive to the Corn Ear Worm than cotton; and secondly, by the use of an insecticide.

*Trap Crop.*

The most effective is maize. As its name implies, Corn Ear Worm has a great liking for maize, preferring it and tomatoes almost to anything else, even when the maize is only 18 in. high.

The trap crop is so used that it keeps the majority of the Corn Ear Worms in the maize until the cotton has got a good start.

This system was applied on the Research Station at Biloela with great success in the 1925-26 season.

The maize was planted as follows:—For every sixty rows of cotton six rows of maize were sown at the same time as the cotton. Five or six weeks later four more rows, and five weeks later another four. The third planting was badly hit by a drought, and matured very late. In spite of this the first two plantings enabled us to harvest over 1,200 lb. of seed cotton to the acre.

On the same farm, where the second planting had not been done and the third was stunted (as it was all over the farm), the amount of cotton was so small as not to be worth picking, and thus 6 to 7 acres were lost.

The essential part of the trap crop idea is that the maize should be cut just before it ceases to be attractive to the moths as a place on which to lay their eggs—i.e., before the silk dries up. It is at this time full of grubs which are thus destroyed.

The cut maize can be put into a silo or fed to cattle. In either case thousands of grubs are prevented from completing their development, and the second sowing is growing up to catch those moths still on the wing or emerging from the soil after the first sowing of maize is cut.

It is most important to cut this first sowing; the second should be cut also, but can be left if time does not permit of its being cut. *The first should never be left standing.* If it is it simply acts as a breeding ground.

The cost of sowing, cultivating, and cutting a trap crop comes to 25s. 6d. per acre of maize, exclusive of charges for the farmer's time and cost of stacking in silo.

*Natural Enemies.*

The Corn Ear Worm is not allowed to have things all its own way, for it is preyed upon by a variety of enemies, and under certain climatic conditions it is killed by a bacterial disease.

It was stated above that all eggs do not hatch. Apart from those which are washed off the plants by heavy rain, others are sucked by a



small bug,\* and others again are parasitised by three minute parasitic wasps.<sup>†</sup> The grub itself is parasitised by four different species, and two predatory wasps also prey upon it. Altogether we have thirteen enemies of this insect, including the grub of an unidentified Carabid beetle. The full effect of these numerous enemies is not felt until towards the end of midsummer, so that, although they are a great help, the farmer has to supplement their attack with his own efforts.

The little egg sucking bug is always abundant on maize, where it goes to feed on *Aphis*, but it is quite common on cotton also. In certain circumstances grubs attack and eat one another.

#### *Control by Means of Insecticides.*

Definite results from the use of insecticides have not yet been obtained.

Experiments designed for the 1926-27 season at Biloela were rendered negative firstly by the dry spring, and then by excessive rainfall, but are to be continued in the following season (1927-28).

The result of such tests as we were able to make shows that calcium arsenate dust applied at the rate of 15 lb. to the acre will stop an attack.

It seems that two applications when cotton is squaring (in January in a normal year), at a fortnight's interval, are all that will be required. The present price of calcium arsenate is 1s. 4d. per lb. in bulk.

#### SUMMARY.

(i.) (1.) The Corn Ear Worm is a caterpillar which hatches from an egg laid by a moth on maize and cotton (and a number of other plants).

(ii.) It does most destruction to the cotton crop during January and February.

(iii.) On the cotton it feeds first in the tender leaves at the top of the plant and then eats squares, and bolls if present.

(iv.) It prefers maize to cotton.

(v.) *Protective Measures.*—(1.) If an early sowing of cotton is not possible, then, in the first week of November or at the time of planting, sow six rows of maize for every sixty rows of cotton. Five to six weeks later sow four rows of maize for every sixty rows of cotton. Five to six weeks later sow another four rows of maize for sixty rows of cotton. Cut first and second sowings when silk begins to dry (say seventy-five days from sowing). Never leave them standing after this time.

(ii.) If early sowing is possible, this in itself should ensure protection so far as experience goes at present. The latest date at which cotton can safely be sown to escape harmful Corn Ear Worm attack is the middle of October.

(iii.) Experiments with insecticides are not yet completed, but will be published later. So far it appears that two dustings with calcium

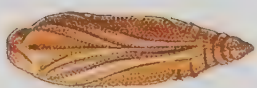
\* *Triphleps australis* China.

† *Trichogramma rava* Girault; *Trichogramma australicum* Girault; *Neutocnemus*





*I. W. Helmsing. 1926.*



arsenate at the rate of 15 lb. of dust per acre at the time of squaring (two to three months from planting) at fourteen days' interval will check an attack.

### THE PEACH GRUB.<sup>6</sup>

(Plate II.)

This insect is not so important a pest of cotton as the Corn Ear Worm, or the sucking insects which will be described later, but is taken now as, like the Corn Ear Worm, it is a pest of maize and in other ways its habits are similar.

Like the Corn Ear Worm, too, it is not peculiar to Australia, but exists in many other places as well.

The life-history of the Peach Grub is briefly as follows:—

The moth (Plate II., Figs. 4, 5) is a handsome orange-yellow insect with black spotted wings which measure rather less than 1 in. when stretched out. The eggs, which are very small cushion-shaped objects, when laid on cotton are put between the bracts and the boll, but are also laid on the boll itself. When ready to hatch, they are a conspicuous red colour. The little caterpillar or grub hatches out from the egg and burrows into the boll, often feeding about on the outside before burrowing in. The favourite place of entrance is at the bottom of the boll. Like the Corn Ear Worm it wanders about to a certain extent, and it is often difficult to tell whether a boll is attacked or not unless the under side is examined.

The full-grown grub (Plate II., Fig. 2) is usually a dirty-green colour, with many large oval darker green spots formed by a thickening of the skin. Sometimes it is distinctly pink, but the spots are dark green. When disturbed it drops towards the ground on a thread of silk. This is a very characteristic trick. The Peach Grub makes a large entrance hole and devours the seeds inside the boll. It generally leaves a small tube of silk hanging from the hole; this tube is always covered with excreta. Not only the bolls but also the stems may be attacked either from the side or bored directly down from the growing point.

When the grub is full fed, which takes about three weeks in late summer, it spins a cocoon inside a dried and damaged boll or on the outside, using the bracts as additional covering; or it may spin a leaf to a boll and make its chrysalis (Plate II., Fig. 3) inside. It does not pupate in the ground like the Corn Ear Worm. In course of time the moth emerges and mates, and the life cycle starts again.

As the weather cools in the autumn an increasing number of grubs spin cocoons or hide in old bolls (or damaged maize cobs) for the winter, emerging as moths in the spring.

On the coastal areas moths will come out in midwinter, but inland not until September.

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<sup>6</sup> *Conogethes punctiferalis* Gn.



*Practically no infection of cotton takes place until the end of February, and by the time a generation has been produced of sufficient numbers to be dangerous most of the cotton has been picked. In all cases where Peach Grubs have done serious damage it has been found that cotton was planted late or the season was such that cotton matured late.*

Early planting, so desirable for other reasons, ensures protection from the Peach Moth. In localities where it is numerous it will take some of the top crop, but in anything approaching a favourable season this can be allowed to go, as it will in any case be poor-quality cotton owing to the boll-rots, which will be mentioned later.

To help keep the Peach Grub under control, cut and burn the crop as soon as a profitable picking has been obtained (as near the middle of July as possible). In this way all the overwintering grubs in the damaged bolls will be killed. Cows can be turned into the fields to eat off the remaining green bolls, but this should not be regarded as a method of control by itself, but simply as an accompaniment to the cutting and burning in July. Never store maize in the cob, as it is sure to contain grubs which will give rise to moths in the spring.

When a maize trap crop is being grown on the farm, numbers of Peach Grub Moths will be attracted to it. Indeed, the drying up and ripening of the ordinary commercial crop of maize seems to be the primary cause of Peach Grub Moths being driven to the cotton.

Besides maize and cotton, Peach Grubs attack sorghums, many kinds of fruit, beans, cowpeas, and castor.

#### SUMMARY.

(a) (i.) Peach Grub is a caterpillar about 1 in. in length, generally a dirty light-green colour with large conspicuous darker green spots. Its parent is a yellow moth with black spots on the wings.

(ii.) Eggs are usually laid by the moth on the boll, which the caterpillar attacks from below and eats out the seeds.

(iii.) The chrysalis is made inside or outside the damaged boll.

(iv.) The grub passes the winter in similar situations.

(b) *Protection*.—(i.) Early planting as for Corn Ear Worm.

(ii.) Cut and burn crop as soon as economically possible (mid-July).

#### THE PINK BOLL WORM.<sup>7</sup>

(Plate III., Figs. 4, 5.)

This insect occupies at present a peculiar position amongst Queensland's cotton pests, in that, although it has been found in a seashore living species of *Hibiscus* all down the Queensland coast, it is only a pest of cotton as far south as a little below the 26th parallel.

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<sup>7</sup> *Platyedra gossypiella* Saunders.

It is well established as a cotton pest in those districts first associated with cotton-growing, notably the coastal side of the ranges from Bundaberg to Rockhampton, the Dawson Valley, part of the Burnett, the Boyne Valley, and a very light infestation in the Callide Valley.

This boll worm is the caterpillar stage of a small greyish brown moth with fringed hind wings. The moth is very difficult to find in the field, but is sometimes seen amongst stored seed cotton. The boll worm itself is about  $\frac{1}{2}$  in. long when mature. It has a dark or lightish brown head, and is either more or less completely salmon-pink or the pink colour appears as spots. The only insects with which it is likely to be confused are a half-matured Peach Grub or a very small bright-pink caterpillar found in damaged bolls, but which is only a scavenger; and it can be distinguished from the former by the large dark-green spots on the Peach Grub and the Peach Grub's untidy habits of feeding, and from the scavenger by the more slim appearance, smaller size, and smaller light-brown head of that insect.<sup>8</sup>

Eggs are laid by the parent moth on bolls, often in the crack along which the mature boll will split, or at the base of the bracts surrounding the boll. The grub hatching from the eggs bores into the boll, sometimes feeding on the boll-wall for a time before entering a seed.

The wound made by its entrance into the boll heals up, and until the boll is opened there is nothing to show that a Pink Boll Worm is inside. Bolls about half-grown are preferred. When the grub is ready to turn into a chrysalis it cuts a hole to the outside. This is a very characteristic elliptical hole quite unlike the large holes made in bolls by Corn Ear Worm, Peach Grub, or Rough Boll Worm. The small brown chrysalis can often be seen in recently opened bolls or sometimes in the bracts of green ones.

When pressed for food the Pink Boll Worm will eat all parts of the cotton plants, but normally it prefers bolls.

The Pink Boll Worm has great powers of resistance to adverse conditions, and can, when mature, lie dormant for considerable periods. The writer has received live Pink Boll Worms from a sample of cotton which had been lying in a Sydney office for nearly two years.

What the Boll Worm does is to curl up inside a cotton seed, sometimes pulling another one over it and spinning the two together. In this state it can resist a surprising amount of drought and flood, heat and cold. It is this habit of lying up in the seed which has enabled it to penetrate into so many cotton-growing areas.

This pest has done a considerable amount of damage in Queensland in some places. The remedies are as follows:—

- (1) *Never* grow standover cotton in any circumstances, and discourage your neighbours from doing it.

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<sup>8</sup> *Pyroderces* sp. When any doubt exists, send specimens to the Chief Entomologist, Department of Agriculture, Brisbane.



- (2) Do not ratoon, as the more early maturing ratoon plants give an advanced food supply to Pink Boll Worm, and annual cotton will then suffer.<sup>9</sup>
- (3) Clean up fields after the last cotton crop, in more or less normal years by the middle of July.

It is better to sacrifice a few pounds of stained lint than to risk carrying Pink Boll Worm over the winter. Bushes should be heaped and allowed to dry and then set on fire. So far as can be managed, leave no bolls or trash lying in the fields, discourage all volunteer plants, and burn all old bushes, bolls, and trash at the end of the season. The greener the crop is when cut, the less fallen dried bolls there will be.

If all farmers in the Pink Boll Worm areas will co-operate in this, the pest will never assume first-class importance. If they neglect to do so, the cotton-growing industry might quite possibly be ruined.

The remaining remedy, that of disinfecting all seed by heat, is at present performed by Government, and presumably has had a good effect, as no new areas of Pink Boll Worm infection have been found since the 1924-25 Pink Boll Worm survey was made, after which date all seed for sowing has been treated by heat.<sup>10</sup>

Two machines are installed for treating seed, one at Rockhampton and one at Whinstanes. The seed is heated to 140 deg. F. and samples taken at intervals for testing germination.

The temperature of 140 deg. F. is sufficient to kill the boll worms, and does not injure the seed, which can survive a very much higher temperature.

## (B) Minor Pests and Pests of Sporadic Occurrence.

### CUTWORMS.<sup>11</sup>

These grubs turn up in certain years, and when they do so commit great havoc. They have not yet been sufficiently studied to enable one to say that they will be of annual occurrence. In November 1925 and October 1926, many early crops were lost and resowing necessitated by them.

Their method of attack is either to eat the leaves of seedlings when only a few inches high, or else to girdle the little plant, ringbark it as it were, so that it falls over and dies.

The grubs feed only at night, hiding by day in the soil near the plants.

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<sup>9</sup> This is not mere theory but has been proved in three consecutive seasons.

<sup>10</sup> Apparently some doubt exists as to whether the Queensland Pink Boll Worm is the same as the one which has penetrated into almost all cotton-growing countries and done untold damage. Whether it is or not, it behaves in the same manner and is very closely related, and is potentially as dangerous.

<sup>11</sup> *Euzoa radians* Guen.

Like the Corn Ear Worm and Peach Grub, Cutworms are one stage in the life cycle of a moth. We do not know the causes of their sudden appearance, nor why they should be present in some years and absent in others.

They can, however, be controlled when they do appear. This can be effected by spreading a poisoned bait around the plants. The Cutworms will be attracted to this, feed on it, and die. The poison often takes a little time to act, but once it has been eaten the grubs cease to feed.

The presence of Cutworms can be detected when large pieces are seen to have been cut out of the first leaves, or when a seedling is seen to be girdled and has fallen over. If the soil in the vicinity of such seedlings is scraped over carefully, one or two dark, dirty-green grubs will be seen lying curled up under the soil. They are about the size of the Corn Ear Worm. This will be a sure indication that Cutworms are present, and steps should be taken at once to destroy them.

Apart from the poison bait, the formula for which is given below, chickens are useful allies of the farmer. Once they have been shown a few Cutworms and where they can be found, they will eagerly feed on them.

The formula for the bait is as follows:—Bran, 25 lb.; Paris green, 1 lb. Mix well together, then add molasses and sufficient water to ensure a mash damp enough just to crumble in the fingers.

This should be put out late in the evening. It might be necessary to repeat the application in a week's time. In late 1925 the cotton at Gatton Agricultural College and a plot in Brisbane were saved by the timely use of this bait, and success was obtained in 1926 in several localities by the same means.

Observations made at Biloela in 1926 showed that there was an intimate connection between the presence of bullhead and pigweed (specially the former) and Cutworm attack. It was found that, where bullhead was present either on headlands or in the fields and had not become straggly, it was always chosen by the Cutworm moths as a place under which to lay. It appeared that a shaded, moist soil was essential for egg-laying (although under certain conditions a moth will lay anywhere when forced to do so). Eggs are normally only laid in the soil and under cover. For a time, provided there is enough of the wild food plant, the grubs will feed on it, scattering later to the cotton.

Where fields are kept clean, our observations all pointed to the fact that attacks by Cutworms are *always the result of invasions from headlands or neighbouring weedy paddocks.*

We have seen no evidence to support the idea that eggs are laid under cotton plants, but everything points to their being laid in normal circumstances under low-growing, spreading weeds such as pigweed<sup>12</sup> and bullhead,<sup>13</sup> especially the latter.

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<sup>12</sup> *Portulaca oleracea.*

<sup>13</sup> *Tribulis terrestris.*



Once more the necessity for clean cultivation for control of insect pests is demonstrated.

Cutworms, as is the case with other pests, have their enemies, which seem to make themselves felt very quickly. These includes a fly,<sup>14</sup> a predatory wasp<sup>15</sup> (a very hard worker which must destroy numbers of Cutworms), a parasitic wasp,<sup>16</sup> and an egg parasite.<sup>17</sup>

*If an attack is noticed in time, it will seldom be necessary to bait a whole field; baiting in front of the attack and in the occupied area will be sufficient.*

### THE ROUGH BOLL WORM.<sup>18</sup>

(Plate III., Figs. 1, 2, 3.)

This boll worm is seldom a really serious pest, although it does a fair amount of damage in some localities in certain years. Like the other boll worms it is the caterpillar stage of a moth (Plate III., Fig. 3), a small insect with straw-coloured fore wings with a green, wedge-shaped strip running along the length of them, the narrow end of the wedge being towards the body. The moths measure  $\frac{1}{2}$  to  $\frac{3}{4}$  in. across the outstretched wings.

The moth lays small white or bluish tinted eggs on the upper leaves and stem of cotton plants, one or two at a time on each plant. From these hatch the caterpillars (Plate III., Fig. 1), which either bore into the terminal or attack squares and eventually bolls.

When nearly mature the boll worm is about  $\frac{3}{4}$  in. in length. The forepart near the head is chestnut brown, then a dark-brown area, then yellowish green and set with orange-coloured fleshy spines, those on the upper surface being surrounded by a dark-brown patch. The general effect is of a yellowish grey caterpillar with darker markings, the grey effect being produced by fine yellow lines on a dark background. The caterpillar is a very distinctive one and could not be mistaken for anything else.

The cocoon (Plate III., Fig. 2) is a greyish-coloured object, in shape rather like an upturned boat. It is made anywhere on the plant. The Rough Boll Worm sometimes does some harm to young plants by killing the terminal bud and causing heavy branching. When a big crop is set these branches often split off from the stem.

There is another caterpillar<sup>19</sup> which behaves in a very similar manner to the Rough Boll Worm. As a general rule it ceases to be a pest after early January, but late in the season sometimes increases

<sup>14</sup> Tachinidæ (unidentified).

<sup>15</sup> Sphegidæ—*Ammophila suspiciosa* Sm.

<sup>16</sup> Braconidæ (unidentified).

<sup>17</sup> *Schedius euxoæ* Gir. n.sp.

<sup>18</sup> *Earias huegeli* Rozenk.

<sup>19</sup> *Crociosema plebiana* Zeller.

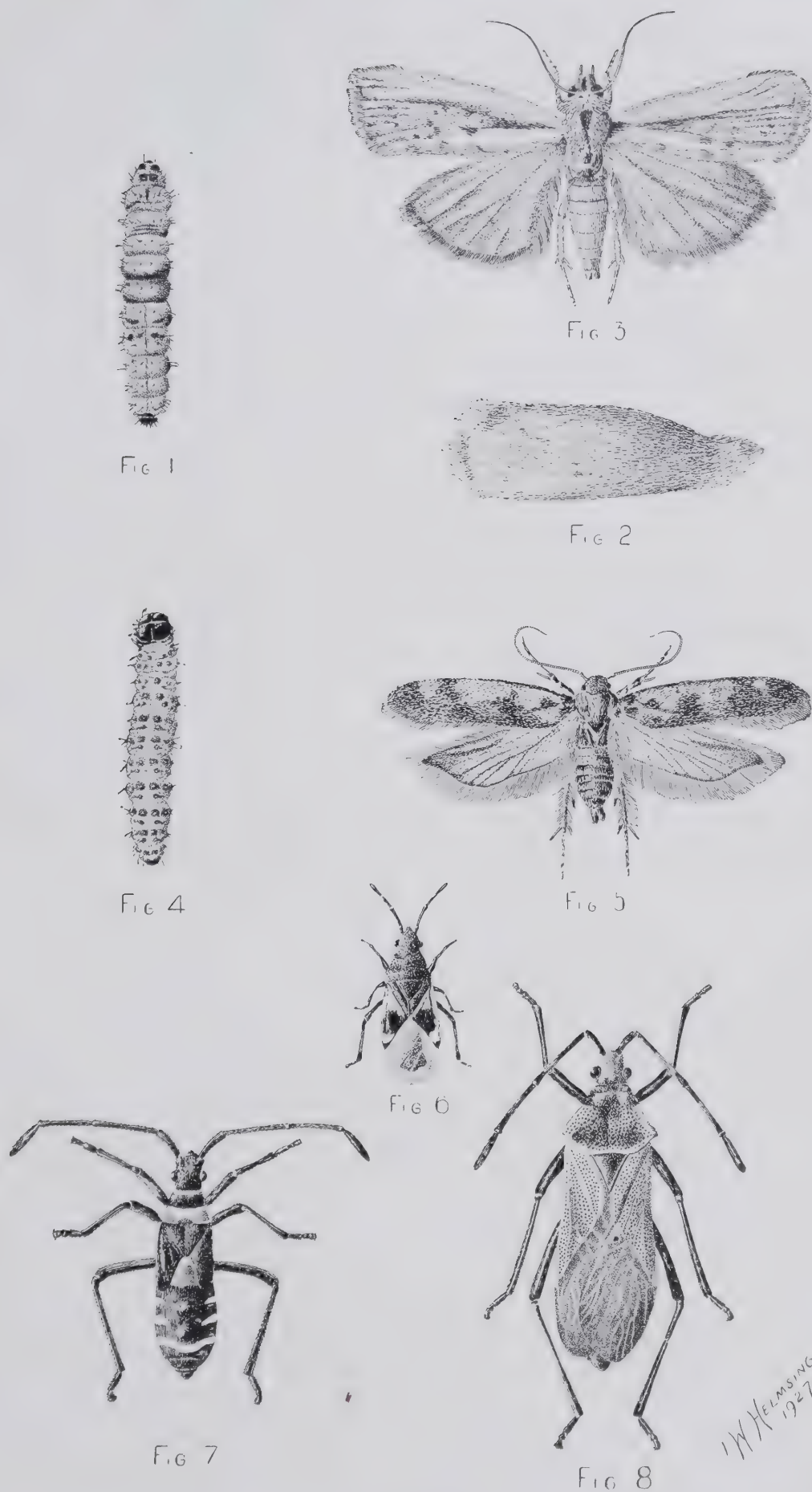


PLATE III.

- FIG. 1.—Larva of *Earias huegeli*.  
 FIG. 2.—Cocoon of *Earias huegeli*.  
 FIG. 3.—Moth of *Earias huegeli*.  
 FIG. 4.—Pink Boll Worm larva (*Platyedra gossypiella*).  
 FIG. 5.—Pink Boll Worm Moth (*Platyedra gossypiella*).  
 FIG. 6.—Adult of *Oxycaraenus luctuosus*.  
 FIG. 7.—Fifth instar of *Aulacosternum nigrorubrum*.  
 FIG. 8.—Adult of *Aulacosternum nigrorubrum*.  
 Fig. 6,  $\times 5$ ; all others by  $2\frac{3}{4}$ .



again. This caterpillar is a small grub with a dark head with a faint pinkish flush just behind the head, but otherwise colourless. It is usually heavily parasitised and does not as a rule call for remedial measures. There are two other grubs which appear on the cotton. One<sup>20</sup> is a large grub rather bigger than the Corn Ear Worm, with a light stripe running the length of its body and a series of black triangular markings. When in a cotton field it will attack leaves, squares, and bolls. The eggs are laid in a mass covered with brown hair on the under sides of leaves, and the little, freshly hatched caterpillars feed in a group, scattering later as they grow older. The chrysalis stage is passed in the ground. The moth is a handsome insect with dark-brown fore wings marked with buff and with a violet patch near the upper angle. Fortunately these insects are only rarely seen in cotton fields.

The other grub is a green looper<sup>21</sup> caterpillar which eats leaves and occasionally bracts. The chrysalis is made in a rolled-up leaf. The moths are marked with yellow and brown, the males being darker than the females.

It is very rarely that this insect does any harm, indeed it often does good to a plant which has set too much leaf after excessive rain.

In 1923, in many places a small leaf-eating beetle did a lot of damage by defoliating the plants.<sup>22</sup> It has not been in evidence since that time. Should it reappear, the fact should be reported to the Chief Entomologist and specimens of the beetle sent to him.

### The Stainers.

(Plate IV.)

The insects whose activities have been described in the preceding pages have four distinct phases in their lives, of which only one actually damages the cotton. Those phases are the adult moth, the egg, the caterpillar, and the chrysalis or pupa. The caterpillar stage is the destructive one. There is another class of insects, the bugs, which shows differences from the foregoing. Firstly, in the method of feeding. The bugs obtain their food by sucking; their mouths are provided with structure adapted to this, whereas caterpillars have jaws and bite their food. This difference is important, as it means that the bugs cannot be controlled by poisoning their food, while this is perfectly possible in the case of caterpillars. Secondly, there is no pupa or chrysalis stage; and thirdly, the young bugs or nymphs bear a general resemblance to their parents, and damage is done to plants by either nymphs or adults.

In most of the pests to be considered in this bulletin, the adults lay eggs either in the soil or on the cotton plants. The young bugs hatching from these soon begin to feed; they differ from their parents chiefly in

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<sup>20</sup> *Prodenia litura* Bois.

<sup>21</sup> *Cosmophila flava* F.

<sup>22</sup> *Monolepta rosea* Blkb.



FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.



FIG. 5.



FIG. 6.



FIG. 7.



FIG. 9.



FIG. 8.



FIG. 7A.



FIG. 8A.

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1926.

PLATE IV.—THE COTTON STAINER (*Dysdercus sidx*).

- FIG. 1.—Egg  $\times 12$ .  
 FIG. 2.—First instar  $\times 12$ .  
 FIG. 3.—Second instar  $\times 6$ .  
 FIG. 4.—Third instar  $\times 6$ .  
 FIG. 5.—Fourth instar  $\times 8$ .  
 FIG. 6.—Fifth instar  $\times 4$ .  
 FIG. 7.—Adult male  $\times 3$ .  
 FIG. 7A.—Posterior ventral segments (male)  $\times 3$ .  
 FIG. 8.—Adult female  $\times 3$ .  
 FIG. 8A.—Posterior ventral segments (female)  $\times 3$ .  
 FIG. 9.—Femur  $\times 8$ .



size and in the absence of wings. During the nymph life they cast their skins, or moult five times and after the fifth assume the adult form. The rudiments of the wings are visible after the third and fourth moults.

Feeding is effected by means of two pairs of needle-like structures, the stylets, which are enclosed in a jointed sheath, the rostrum. The stylets when applied to one another form two channels down one of which is a flow of saliva, and up the other the plant juices can be sucked; at the same time they are thrust into the part of the plant on which feeding is taking place, so that they are used for both sucking and piercing. The rostrum is not pushed into the plant, but is either folded under the body while feeding is in progress, or serves as a guide for the stylets.

This briefly is a general account of the habits of the bugs which is necessary for an understanding of the harm done by them, and the measures which must be taken to control them. The three insects to be considered now all damage the seed, and two of them damage the developing boll as well. They are the Harlequin Bug,<sup>23</sup> the Cotton Stainer,<sup>24</sup> and the Cotton Seed Bug.<sup>25</sup>

### THE HARLEQUIN BUG.

This very handsome insect is to be found in most of the Pacific Islands, in Queensland and New South Wales, and in the Northern Territory. In the 1923-24 and the 1924-25 seasons it did a lot of damage to cotton in Queensland, causing stained lint, damaged seed, and deformed bolls.

The Harlequin Bug is a large, shield-shaped insect from  $\frac{3}{4}$  to nearly 1 in. in length. Its colouring generally consists of some combination of yellow and orange and metallic green or blue. Certain individuals are scarlet and blue, these latter appearing mostly in the spring and autumn. All show a great variety of pattern, and are very conspicuous insects and not easily overlooked. The nymphs are coloured blue or green and red, except just after moulting, when they are a brilliant orange-red. The average length of life in the summer in Queensland is as follows:—Egg, 16 days; nymph, 70 to 77 days; adult, 90 days, more or less according to circumstances.

Investigations carried out at the Cotton Research Station show that in a normal season the Harlequin Bug migrants begin to come into the cotton fields shortly before the first flowers open, and keep on arriving after that time for a month or more; in the meanwhile the first arrivals have laid eggs, and soon the population in the fields increases rapidly.

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<sup>23</sup> *Tectacoris lineola* F.; sometimes known as the Chinese Bug.

<sup>24</sup> *Dysdercus* *sidæ* Montr.

<sup>25</sup> *Oxyarcænus luctuosus* Montr.



PLATE V.

Showing damage done to cotton bolls by bug punctures through which fungus spores penetrate, staining and weakening the lint. At "A" is the callus surrounding the wound.



Young bolls are selected by the nymph and adults for food. When very young bolls are attacked, they are shed, but since the bugs do not breed very fast no great loss occurs from this cause, as the plants keep ahead with square and boll production.

Later on, when the bolls are bigger, the bugs are piercing them, and through the holes made in the boll-wall fungus spores or moulds get into the bolls and stain the lint. (Plate V.) When a seed is reached by the insects, as often happens, then that, too, becomes inoculated with a fungous disease.<sup>26</sup> The result is shown in brown-stained weak cotton, seeds failing to germinate, deformed and prematurely opening bolls. After bolls have opened, Harlequin Bugs feed on the seeds.

The actual amount of damage done to any boll by the sucking and puncturing alone is very small. The chief harm done by these bugs is in their providing a means of entrance to the moulds of boll-rot fungi. Towards the end of the season over 80 per cent. of the bolls will be affected by boll-rots alone.

Harlequin Bugs are on the whole lethargic animals, easily seen and caught. The eggs are laid some 80 to 120 at a time, wrapped round a twig or a leaf-stalk. They appear like a lot of small, pearly, pinkish pills side by side, forming a cylinder or very broad band around the place where they are laid. The nymphs generally live clustered together, especially in the early stages. Adults often sit about on the plants and are not easily disturbed. The females have the habit of sitting on their eggs until they hatch.

#### REMEDIES.

Harlequin Bugs come into the cotton fields from the scrub and places where other natural food plants exist.<sup>27</sup> While they are coming in they should be caught and destroyed. All egg-masses should be destroyed whenever found, as should also clusters of nymphs. Systematic hand-picking spread over a month will go far towards reducing infection. November and December would probably be the best months, but the bugs may not start coming in until later. It will depend on the state of the cotton and the effect of the previous spring on the bugs.

Very hot, dry weather checks the rate of increase; frosts kill adult bugs, but not the nymphs, which seem to be more resistant to extremes of heat and cold.

Like most insects the Harlequin Bug has its natural enemies, but they only exercise a partial control and do not keep it completely in check. Breeding appears to occur all the year round, although the life cycle is considerably prolonged during cold weather.

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<sup>26</sup> *Fusarium moniliforme*.

<sup>27</sup> Bottle and Kurrajong trees (*Brachychiton* spp.) and *Hibiscus* spp.

## THE STAINER.

## DESCRIPTION.

The Stainers when adult (Plate IV., Figs. 7, 7a, 8, 8a) are medium-sized insects a little over  $\frac{1}{2}$  in. in length. The front part of the wings is either dark brown, brown-grey, reddish brown, or almost orange, the exact colour depending partially on age. There is a black dot in the middle of each wing, and the ends of the wings are very dark iridescent green. Legs and antennæ or feelers are dark brown or black. The under side of the body is white with a certain amount of black. This white colouring changes to yellow as the insect gets older.

There is another bug with which these might be confused, but this is red or orange and black underneath, and there are no spots on the wings.<sup>28</sup>

## HABITS.

The Stainer has not yet been under observation sufficiently long for one to be absolutely certain when to expect the first arrivals in the fields. So far as we know, in a fairly normal season it will be about the beginning of the New Year, or approximately at the time the first bolls are beginning to open. The period of migration seemed to last a month or so, but a great deal depends upon meteorological conditions, and even more on the abundance and conditions of natural food plants. The bugs feed on green bolls, damaging them in the same manner as the Harlequin Bug. They show a decided preference for cotton seed, and provided the days are not too hot and dry numbers of Stainers can be found crowded into the open bolls, or on those which are just beginning to crack, for which they show a decided preference. Very hot weather causes them to remain inactive during the hottest times of the day, and they remain as much as possible in shelter. A heat wave such as that of February 1925 or the dry spring of 1926 checks them considerably. They are very dependent upon moisture, and will kill one another if they cannot get it. They have often been seen to feed on other insects.

Individuals will live as long as 65 days in favourable circumstances in the summer, and very much longer in the winter, the females laying as many as 850 eggs; probably 500 to 600 is about the usual amount (but much depends on the food upon which they are living). The number laid at any one time varies from about 50 to 100. They are always laid, a number together, either just under the surface of the soil or under a little clod or a piece of stick or some such protection. The eggs are like miniature hen's eggs (Plate IV., Fig. 1) when first laid—pearly, changing to orange before hatching. They hatch in 4 to  $6\frac{1}{2}$  days in summer. As the weather gets colder they may take over three weeks or a month, failing to hatch altogether when the average temperature is 60 deg. F. and below.

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<sup>28</sup> *Aulacosternum nigrorubrum* Dall.



The little bugs (Plate IV., Figs. 2 to 6) emerging from the eggs are orange-red until after their first moult, when they are red and black. They get more white on the hind part of the body or the abdomen as they get older, especially in the last stage before becoming adult. All except the first stage are keen feeders on cotton seed, and they will also suck green bolls and the stem. They are fond of shade and moisture. Left undisturbed and provided with suitable food, the Stainers will go on breeding all the year round, and can always be found males and females coupled together. The only difference that cold weather seems to make is that all the different stages take longer to complete. Development seems to cease when the mean temperature averages below 60 deg. F. The nymph stage in summer lasts altogether about four weeks, so that it does not take long for the first migrants from the bush to breed up a big population. The early pickings of cotton are always much more free from stain than later ones, for this reason: Very hot weather, by limiting the activities of the Stainers, also means cotton free from the brown stain which takes so much off the prices. This was very noticeable in the 1925-26 season, when prolonged hot, dry weather was accompanied by a very small Stainer population, and the cotton in consequence was of exceptionally high grade.

#### OTHER FOOD PLANTS.

Stainers feed on several wild and cultivated plants besides cotton, but principally on those related to cotton, or closely allied families such as species of wild and cultivated hibiscus, bottle trees, kurrajong, *Sida retusa*, and other common weeds. So far as our investigations have gone, not even kurrajong and bottle-tree seeds have the same food value for Stainers as cotton. *Sida* and *Malvastrum* seeds only enable them to reproduce small broods.

#### CONTROL.

The stock remedies for Stainers are—

- (1) Destruction of wild food-plants;
- (2) Traps of cotton seed;
- (3) Early clean-up of the crop; and
- (4) A dead season when no cotton is grown.

No. 1 is out of the question in Queensland and will be for many years to come. No satisfactory trap is yet forthcoming which would commend itself to farmers, and experiments in this direction are still in progress. Insecticides are out of the question and need not be considered.

No. 3 is most important from every point of view, and is dealt with in detail later. It will be enough to say here that, if cotton is left to stand over or neglected, in the following season Stainers will get a flying start and begin breeding in the crop long before they would have done had there been a complete clean-up and burning of the previous

season's crop. *A standover crop is far more dangerous than any wild plants in the bush.* When cotton bushes are stacked and left to dry before being burnt, most of the Stainers present in the fields will collect under them and will be destroyed when the stacks are set on fire.

#### SUMMARY.

(a) *Habits*.—(i.) Stainers begin coming in to the cotton in January, or later according to the season.

(ii.) Damage both by piercing bolls and admitting moulds and boll-rots and by damaging seed in open bolls.

(iii.) Life cycle in summer about five to six weeks.

(iv.) Eggs laid in the ground, young bugs feed on all parts of the plant, but specially seeds.

(v.) Flourish best in the presence of moisture and moderately high temperatures.

(b) *Protection*.—(i.) Traps are being tried but tests of this method are not yet completed.

(ii.) Clean-up of crop as soon as it is finished (June and July).

(iii.) Never leave cotton to stand over from one season to the next, as bugs shelter and breed in such fields.

#### COTTON SEED BUG.

(Plate III., Fig. 6.)

This little insect does no harm to cotton until the bolls open. It is coloured black with clear wings each bearing a large black spot. In length it is  $\frac{1}{10}$  in. Early in the season it can be found feeding on the seeds of *Sida* sp., Wild Hibiscus, Flannel weed, and other related plants. It soon comes into the cotton and shelters in the squares, sometimes but rarely laying on a young boll. It does not begin to breed to any extent until bolls begin to open. Both young and adults feed on the seed, either in the mature boll or in a boll damaged by boll worms, and in which a hole has been cut. In very hot weather the open bolls are more or less deserted by day, but normally nymphs and adults crowd them.

Eggs are laid in the lint. They are quite easy to see once one is familiar with them, even when freshly laid. When nearly mature they assume a reddish orange colour (due to the developing nymph inside), and are then quite conspicuous. The eggs take 5 to 6 days to hatch and the whole life cycle occupies only about 20 to 30 days, so that multiplication is rapid.

The seed is damaged in the same manner as it is by the Harlequin Bug and the Stainer. This damage consists of a certain amount of mechanical damage, but a more serious thing is that the entrance for a fungus is made and very often the embryo in the seed is destroyed. (Plate VI.) In consequence, seed from a heavily attacked field shows





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poor germination, and the first pickings are better than subsequent ones. Seeds infected with the fungus sometimes germinate, but often the young root is subsequently attacked and the seedling withers. The effect of all three bugs is to reduce the amount of oil in the seed, so that a loss occurs whether the seed is used for sowing or not. The Cotton Seed Bug can often be seen sheltering in maize early in the season.

Bugs can be found sheltering in damaged and rejected bolls after picking is over. They seem to be resistant to low temperatures, for eggs and young ones have been found after hard frost and cold nights. High temperatures do not agree with them, and, in one lot of cotton which was under continuous observation during the exceptionally hot summer of 1926, the rate of increase was very low.

#### REMEDIES.

There is little that can be done to check these pests which would be economically possible apart from general cleanliness of the fields and headlands.

The damage done is confined to the seed, but in spite of this, with seed giving 65 per cent. germination under laboratory conditions if sown at the rate of 20 lb. to the acre, excellent strikes are obtained. At present this seed rate is all that is economically possible in the way of escaping from the effects of these bugs.

#### FALSE STAINER.

There is another bug<sup>29</sup> (Plate III., Figs. 7, 8) which, although at present of minor importance, might possibly become a major pest; indeed, even now in certain localities it causes quite a serious amount of square-shedding. This bug is in general appearance very like a Stainer and is often mistaken for one; it is known as the False Stainer. It belongs to a different family and has quite different habits. It is about  $\frac{3}{4}$  in. in length with dark-brown or black legs and antennae, otherwise ochre-coloured except the membranous part of the fore wings, which is black. The under side of the abdomen is reddish or grey with black stripes.

The damage done by this insect is to squares and small bolls, which it pierces with its stylets and causes to shed. It arrives in the cotton fields late in November and is active during the next two months. The eggs are laid in small batches of 4 to 8 attached to a leaf, usually on the under side. They are small bronze objects flattened at one end. The nymphs (Plate III., Fig. 7) are conspicuously coloured black and red and yellow. There are two small parasitic wasps<sup>30</sup> which lay in the eggs, and which appear to keep the bug from becoming a serious pest; no other natural enemies have been found. The adults have been found during the winter sheltering in fence-posts.

<sup>29</sup> *Aulacosternum nigrorubrum* Dall. (Coreidæ).

<sup>30</sup> *Hadronotus hirsutioculis* Girault; *H. nigricornis* Dodd.



In addition to the foregoing, several other bugs cause a small amount of loss every season by inducing square-shedding or by infecting small bolls with disease, but they are of very minor importance and do not call for remedial measures.<sup>31</sup>

### Aphids.

Aphids are often found in some numbers on young cotton, but very seldom do any damage, as they are quickly controlled by their numerous enemies, and, provided the plant itself is healthy, need cause no alarm.

### Jassids or Leaf Hoppers.<sup>32</sup>

These little insects are sometimes mistaken for Aphids, although quite distinct from them. They only become a pest on cotton grown in certain soils unsuitable for cotton-growing, generally red volcanic scrub soil deficient in phosphates and potash. When they occur in large numbers it is a fairly sure sign of unsuitable soil.

## CONCLUSION.

This finishes the list of bugs which are likely to come to the notice of the cotton farmer.

After seeing such a list of pests one might be tempted to ask, Can cotton possibly be grown at all? The answer to that question is that even in poor seasons excellent crops have been harvested.

In 1926, in the face of one of the biggest Corn Ear Worm attacks which the writer has seen, 1,200 and 1,500 lb. to the acre from a November-planted crop were secured on the Cotton Research Station at Biloela, by using a trap crop of maize. Early planting is advisable for many reasons, and, as has been seen, this also is of great assistance in checking or avoiding pests.

Two of the most common weeds which follow on cultivation are bull-head and pigweed. While these are young they form the favourite egg-laying place for the Cutworm moth, providing both the food for the little grubs and the shelter and moisture that the eggs appear to require. The Corn Ear Worm also feeds on pigweed until it has become too old and tough, and a cotton field full of pigweed is sure to attract Corn Ear Worm moths.

Stainers also feed on *Sida*, *Malvastrum*, and other allied plants found in headlands and paddocks.

Good and clean cultivation helps the farmer, not only by keeping his crop healthy in itself but by making life harder for the insects.

Another most important point in insect control is the early and thorough clean-up of the paddocks in which a cotton crop has been

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<sup>31</sup> *Philia senator* (Pentatomidæ); *Ragmus importunitas* Dist. (Capsidæ); *Creontiades modestus* Dist. (Capsidæ).

<sup>32</sup> *Empoasca* spp.

grown. If a crop is "cow-pruned" or ratooned it will put out new shoots with the first rains, and in all probability, in the case of the former, unless there have been severe frosts, will have a sufficient number of bolls and flowers growing during the winter to support enough pests to ensure their getting a "flying start" with the first warm weather. Stainers and Cotton Seed Bugs pass the winter as adults; Pink Boll Worm can overwinter in old bolls and rubbish in the fields; so can the Yellow Peach Moth. When the cutting out of the old crop is delayed a bridge is provided between one crop and the next, and life is made easier for the pests. It is true that there are plants in the bush and scrub on which cotton pests can and do feed, but they are generally widely scattered and often not so nourishing as cotton. The farmer should aim at making the life of pests as difficult as possible. The standover crop, the crop which is cut out late, the paddock left with fallen bolls and rubbish in it, the ratoon crop, all help to keep pests going during the winter or give them an early start in the spring.

More than half the control lies in the hands of the farmer himself. It is realised that there are many difficulties to be met by the farmer in Queensland. These may include dry winter and spring conditions making an early plant difficult to get; or excessive rains when cultivation is impossible; or dry periods during the growing season. At the same time, if he would take a few simple precautions much loss could be avoided. Insects must be regarded as a constant factor in farming just as much as the weather or anything else, and precautions should be taken to control them.



TABLE SHOWING THE ACTIVITIES OF THE CHIEF COTTON PESTS THROUGHOUT THE SEASON IN INLAND DISTRICTS.

	Corn Ear Worm.	Cutworm.	Stainers.	Peach Moth.
September..	Moths emerge from hibernation; first eggs laid on weeds, &c.	Moths emerge from hibernation	On wild food-plants .. ..	Moths emerge from hibernation
October ..	First generation grubs on weeds and maize if present	Eggs laid under weeds; grubs in cotton	ditto .. ..	Grubs in maize, beans, fruit, &c.
November	First generation ends; second generation on weeds, maize, and cotton	Grubs in young cotton planted late	ditto .. ..	ditto
December ..	Second generation on weeds, maize, and cotton; third generation begins end of month	Grubs on weeds on headlands, &c.	Migration from bottle-trees, &c., to cotton commences (date varies)	ditto
January ..	Third generation on pigweed, maize, and cotton	ditto .. ..	Migration to cotton continues..	ditto
February ..	Third generation ends; fourth generation on maize and cotton	ditto .. ..	In cotton .. ..	In cotton, &c.
March ..	Fourth generation on maize and cotton; life cycle lengthening	ditto .. ..	ditto .. ..	ditto
April ..	Fourth generation ends; fifth generation begins late in month on maize and cotton	ditto .. ..	ditto .. ..	ditto
May ..	Fifth generation on maize and cotton; hibernation begins with low temperatures	Hibernation begins .. ..	ditto .. ..	ditto
June ..	Hibernation in soil .. ..	Hibernation in soil .. ..	ditto .. ..	Hibernation in cotton, maize, &c. (if plants not destroyed)
July ..	Ditto .. ..	ditto .. ..	If bushes cut and burned, many destroyed; survivors in bush and standing cotton	ditto
August ..	Ditto .. ..	ditto .. ..	Survivors in bush and standing cotton	ditto

This table does not claim to be final. The exact date of hibernation will depend on whether the frosts are late or early and on the mildness of the winter. In a severe winter and late spring the emergence of those insects which hibernate in the soil will be delayed.

# PRIMARY PRODUCE EXPERIMENT STATIONS.

## LEGISLATION FOR THEIR ESTABLISHMENT.

### MINISTER'S SECOND-READING SPEECH ON NEW AGRICULTURAL MEASURE.

"It is the intention of the Government to co-operate to the greatest possible extent with the growers in the industry, our desire being to secure the interest and assistance of the banana-grower in the same manner as was secured from the sugar-grower. By that means much good will result; the industry will be built up; a greater number will be employed in the industry; and the sum total of the wealth produced in the State increased."—*Mr. W. Forgan Smith, Minister for Agriculture and Stock.*

A new agricultural measure, having for its object the establishment of banana and other experimental stations, was introduced by the Secretary for Agriculture and Stock in the course of the month. Subjoined is the full text, taken from "Hansard," of the second-reading speech of Mr. Forgan Smith on the Bill, and which is of particular interest to rural producers.

The SECRETARY FOR AGRICULTURE (Hon. W. Forgan Smith, *Mackay*): As I explained at the introductory stage of this measure, it is intended to give the Government power to establish experiment stations for all forms of primary produce, following very largely the principles set out in the Sugar Experiment Stations Act, which have been of so much value to the sugar industry.

The main object of the Bill is to enable the Government to carry out various forms of research work that is necessary in the various primary industries, and co-ordinating the various activities engaged in that direction at the present time with a view to bringing about better results than have been obtained hitherto, so that the growers themselves will be personally interested in the various activities carried out. There is a considerable difference between experiment stations of this kind and the ordinary State farms that have been established in the past. Since I have been Secretary for Agriculture, and before then, I have noted that the sugar-grower took a very keen interest in the work of the sugar experiment stations, and that the various field days held by Mr. Easterby, the head of the department, and the work of his officers were closely followed by all those concerned in that industry, whereas, on the other hand, the work of the ordinary State farm did not receive such attention. Of course, a good deal of valuable work can be and is being done on State farms and will continue to be done on certain of them; but the work done does not receive the attention which appears to be desirable.

Mr. Peterson: Some of them are in the wrong place.

### Experimental Plots—The Present Departmental System.

The SECRETARY FOR AGRICULTURE: Undoubtedly some of them are in the wrong place. The further point is often raised by settlers in the various districts that State farms may obtain certain results because they have ample machinery, ample labour, ample fertilisers, and all other resources at their disposal, while the farmer is not able to carry out his operations in the same manner. A good deal of success can be achieved by establishing experimental plots by arrangement with individual farmers in the various districts. The department frequently makes arrangements of that kind, selecting a good resourceful farmer in a given district. We make financial arrangements with him which are satisfactory to both parties, and then we are able to say to his neighbours that the work carried on by such and such an individual is an indication of what should be done throughout the district. Such a farmer sets a standard which his neighbours often endeavour to emulate; and it is our intention to continue and expand that policy as far as possible.





PLATE 150.—THE HON. W. FORGAN SMITH, DEPUTY PREMIER AND MINISTER FOR AGRICULTURE AND STOCK.

### **The Scientist and the Farmer.**

Coming more particularly, however, to the work which it is proposed to do under this Bill, one must readily realise that, if good standards are to be maintained in Queensland, they can only be improved upon by our maintaining the highest degree of efficiency. In other words, we must bring science to bear on the problems of the average farmer and help him to solve those problems; and help him in his various difficulties with a view to enabling him to achieve better results from his own efforts than he has been able to achieve hitherto. Under the Bill we shall have power to deal with all forms of primary produce. It is intended, however, to apply ourselves in the beginning more particularly to the fruit industry.

### **Putting the Land to its Best Use.**

Before I go on to deal with that, however, I wish to say that I have taken out some very interesting figures in connection with the primary products of Queensland, which I shall give to the House at a later date. I have also some interesting figures showing importations into Queensland and other States of Australia of products which, in our opinion, can be successfully grown in Queensland. Therefore, it is the function of my department, and the desire of all good Queenslanders, to see that the land of this State is put to the best use, and that information be made available to land settlers in regard to those crops which will find a ready market in Australia and which are suitable to the climate, soils, and conditions of this State. It is along that line that progress can be made and better results achieved. An example of the value of this kind of work can be seen in the sugar experiment stations I have referred to.

### **The Value of Sugar Experiment Stations Manifested.**

When the Sugar Experiment Stations Act was passed the area of sugar-cane crushed in Queensland was 72,651 acres, and the yield 848,238 tons of sugar-cane, or an average of 11.68 tons of cane to the acre. The return from the cane was 92,554 tons of sugar, or an average of 9.44 tons of cane to the ton of sugar. Hon. members will note particularly those figures—a little over 11 tons of cane to the acre and about 9½ tons of cane to the ton of sugar.

In 1926 the area of cane crushed was 189,312 acres, which gave a return of 2,925,662 tons of cane, or an average of 15.45 tons of cane to the acre. From this cane 389,272 tons of sugar were made, or an average of 7.52 tons of cane to the ton of sugar. During the period of the activities of the sugar experiment stations the yield per acre increased from 11½ tons to 15¾ tons per acre, and the amount of sugar-cane required to produce a ton of sugar was reduced from 9½ tons to 7½ tons, showing remarkable progress during the period under review, and indicating that the industries in the State are getting a splendid return from the cost of the establishment of these experiment stations.

While giving due regard to the improvement that has taken place in the efficiency of the mills, I claim that most of that improved return is due to the improved methods of cultivation on the farms, due to the improvement in the various types of plants made available to the sugar farmer, and also to the research work accomplished in regard to dealing with the various diseases and pests which afflict that form of plant life. Well, I claim that what can be done in one industry can be done in all. Whilst the proportion of improvement may vary, all indications point to increased returns and greater economic advantages as a result of work along the lines I have indicated.

### **The Value of the Banana Industry.**

As I pointed out yesterday, the banana industry is worth a little over £1,000,000 per annum to the people of Australia. It is an industry which gives a very good return to those engaged in it, and one which is capable of considerable improvement and expansion.

The hon. member for Windsor yesterday referred to the depreciation in quality of bananas. There is no doubt that depreciation in quality has taken place in certain districts. It will be the object of the stations which we propose to establish to lay down the facts with regard to that depreciation, to give the reasons for it, and to find a remedy. There is no doubt that one obvious reason can be stated at once. It is to be found in the depreciation of the lands under this crop. If men grow the same crop year after year without sufficient cultivation and do not fertilise, a depreciation



of soil values must eventually be brought about, with the consequence that good results cannot be obtained. Plant life suffers from malnutrition, and similar results accrue from it as in the case of human beings or stock. It must be understood that to get the best results from any crop proper soil is required, and that that soil requires careful tilth and must have some of its constituents periodically renewed if the same crop is to be grown regularly. It is not possible to carry out a proper rotation of crops in many areas in Queensland such as can take place in other countries or other States in Australia. However, the banana-grower in the main is deeply interested in the future of his industry. I have occasion frequently to meet members of the various sectional committees, including that dealing with the banana industry; and they show an alertness of mind and an understanding of the needs of their industry which appeal to me very much. When that attitude of mind is shown by anyone in an industry, we are justified in assuming that he is prepared to take whatever steps may be necessary to improve the conditions in the industry in which he is engaged; and it is as a result of requests of various kinds and discussions with the banana-growers themselves that I have brought forward the Bill we are discussing this morning. The experiment stations will be subsidised by the Government, but will also be a charge on the industry itself. In the case of the sugar experiment stations the cost is divided between the grower and the Government, a levy being made per ton of cane and payable at the mill. Under this Bill the Governor in Council is empowered to make a levy on the produce of the type which it is proposed to assist, and the fund so collected will be subsidised by the Government with a view to helping the producers to bear the cost of carrying on the activities of the stations. The banana-growers and members of representative organisations to whom I have spoken are quite willing to incur such a responsibility, and evidently feel that advantages will accrue to them from the scheme. There is also in that connection the important fact to be borne in mind that where people are financially interested in the results of the stations or nurseries they will take a more active interest in their work than otherwise, and we shall thus be able to secure complete co-operation between the department and the growers in the industry concerned.

### **The Fiscal Question.**

I mention also—and this is an important phase of the problem to which the grower of bananas must apply himself in this industry—the question of the Australian tariff or the protection that is given to this industry. I lay it down as a definite principle in a fiscal policy that, where a Government gives protection to any industry, it is the moral responsibility of that industry to see that they supply the people with a sufficient quantity of the commodity protected and of good quality to meet their needs. In other words, the National Government say to the industry, “We will give you protection for this industry; we will place an import duty on this commodity, which will enable you to carry on your industry under Australian conditions”; but the responsibility then falls on that industry to rise to the occasion and supply Australian needs in sufficient quantity and of a sufficiently high quality to meet the reasonable requirements of all concerned. That is a principle with which I think everyone will agree; and it is on the maintenance and the carrying out of that principle that the continuance of the duty depends. One can readily understand that, if the general public make serious complaints that they are not being properly served by an industry, any Government would be compelled to pay attention to such a state of affairs.

### **Supplying Australian Needs.**

A good deal of work has already been done in connection with the banana industry; and various organisations of farmers have applied themselves very closely to this problem, achieving considerable results, but much yet remains to be done. I feel that an extension of the industry is required to enable us to meet the needs of Australia. There are areas in Queensland eminently suited to the cultivation of bananas. In many portions of Southern Queensland this industry is being carried on, and the fruit of a high quality is exported from the State and sold locally; but, owing to the ravages of bunchy top in many districts, the production fell away to some extent, some areas being compelled to go out of production. However, Professor Goddard, acting in co-operation with the Department of Agriculture, and assisted by the Commonwealth Government in certain laboratory tests and experiments, has been able to provide a means of coping with this disease, although no remedy or specific that will immediately affect the result has been provided. It is unreasonable to expect that. Unfortunately, we cannot expect any specific that will provide for the immediate eradication of disease in plant or human life; but in connection with the banana industry methods have been set out, which, if followed properly, will enable

this disease to be kept under control. If the banana-growers in Queensland carry out the instructions of the department as set out by the investigation committee, this disease can be kept under control, and the losses that have occurred in the past will not be repeated in the future.

### Bananas in the North.

As the hon. member for Windsor mentioned yesterday, in the northern portions of the State a considerable area was placed under banana cultivation many years ago, but that there has been a great falling off in the industry of late years. I was asked by the hon. member as to the chief reason for this falling off. There is no doubt that one reason has been the development of the sugar industry. The farmer and landholder in areas suitable for the development of sugar-cane found it a more valuable and satisfactory crop than bananas. That was due chiefly to the fact that sugar-mills were provided in suitable areas in the North, and those mills were at all times prepared to take the cane supplied to them by growers within their areas. In other words, the grower of cane was assured of a market in his own district, whereas the banana-grower at that time was dependent on shipping, and much loss resulted to him in transshipping his product from the place where it was grown to where it was sold. Boats loaded at Cairns or Innisfail often took a considerable time to reach their destination. The conditions under which the product was handled and various other factors militated against the farmer securing the best result for his product. In addition, sailings were so few that often a farmer was not able to market his product in a fresh condition. Because of those reasons the banana-grower discontinued operations on a large scale; but in recent years, owing to the situation in the sugar industry where production has overtaken the consumption, farmers have looked to other activities to utilise their available land. There are very rich areas of fertile soil in North Queensland that are not required for sugar cultivation, and during the past two or three years we have been encouraging the holders of these lands to extend their operations into banana cultivation with a view to developing that industry, and with a view to enabling them to make a livelihood from that crop. The Department of Agriculture has been carrying out experiments with bananas at various State experiment stations in the North and on various Crown lands, with a view to developing a type suitable to the conditions obtaining there. Experiments have been carried out at South Johnstone and elsewhere by the fruit section of the department, and up to the present time they have given very satisfactory results, and a considerable development has taken place in the volume of export of bananas from the North. As a matter of fact, I am satisfied that it will be necessary in the very near future to run special fruit trains from North Queensland to cope with the production that is now being carried on there. (Hear, hear!) Another interesting feature is that the product of the grower on the Johnstone River and the northern portions of the State generally carries well and opens up in good condition in the markets in the Southern States. (Hear, hear!) I have heard nothing but excellent reports of the product grown in those areas. However, a good deal remains to be done in that connection, and I am satisfied that work along those lines will give a satisfactory return.

### Commercial Varieties.

The type of banana grown is one that is also being dealt with. I think it was the hon. member for Windsor who yesterday referred to the Gros Michel banana that is grown in other parts of the world. Some years ago the Department of Agriculture imported suckers and plants of the Gros Michel variety, and these were distributed to banana-growers in Queensland with a view to trying them out under Queensland conditions. Unfortunately, a careful record of that distribution was not kept, and the result of the experiment cannot be regarded as satisfactorily affording a definite indication for or against that particular type of banana. Its development under Queensland conditions will require careful observation, so that its history may be carefully noted to determine whether it is a suitable banana for growing in the State. However, further experiments are being conducted to that end in North Queensland, and, as a matter of fact, a considerable portion of the new areas recently planted with bananas is represented by the Gros Michel type in addition to the Cavendish variety. It is interesting to note that nearly four-fifths of the commercial bananas grown in the world are of the Gros Michel type; and one large American firm—Elders, Fyffe, and Company—engaged in the exportation of bananas to Great Britain and other European countries has three-quarters of its turnover represented by that variety. At the same time, it must not be assumed that the Gros Michel is the only type of banana that can be developed and made suitable, a fact which is proved by the action of some of the companies in the West Indies recently sending an officer to Queensland with a view to testing the suitability of other types for their require-



ments. This type of banana is particularly liable to be afflicted by a disease known as the "Panama" disease, and in view of this fact we have been careful not to encourage the importation of the Gros Michel to Queensland, our experiments being conducted with plants that were imported here many years ago. We consider that it is safer to carry on research on a small scale in that way rather than to encourage importations from other countries with the liability of introducing undesirable forms of disease.

### Transport.

In addition to growing the best types of bananas and ascertaining their liability to disease or otherwise, a good deal requires to be done in connection with the transport of this fruit. From investigations which I have recently made I find that a company operating in the West Indies has vessels specially constructed for the transport of this fruit in order to ensure its being marketed in as fine a condition as possible. On the railways special trucks are made available, and everything is done to ensure a high marketable quality. It will be seen, therefore, that a good deal of work requires to be done in this State to ensure the proper handling of the product after it has been successfully grown, because, if methods are laid down whereby bananas can be grown in commercial quantities, it is necessary also to provide for proper handling so that economic loss will not result in transit. In that and in other directions work will be undertaken under the measure now being considered.

### The Government's Rural Policy.

It is the intention of the Government to co-operate to the greatest possible extent with the growers in the industry, our desire being to secure the interest and assistance of the banana-grower in the same manner as was secured from the sugar-grower. By that means much good will result; the industry will be built up; greater number of men employed in the industry; and the sum total of the wealth produced in this State increased. I think I have said sufficient to outline the main principles of the Bill, and, therefore, I have much pleasure in moving—

"That the Bill be now read a second time."

Honourable Members: Hear, hear!

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## GREEN MANURING.

By GEO. WILLIAMS, Acting Director of Fruit Culture.

The maintenance of a reasonable supply of humus in orchard soils, more particularly when planted with citrus, is universally recognised as a necessity, and the most economic way of ensuring it is by systematic application of green manure. Various crops are grown for the purpose, including barley, maize, natal grass, and legumes. The selection of a particular variety to be grown will be guided by local conditions, and in the case of deciduous fruits an autumn or early spring crop would be the most suitable. Summer crops would impede operations among fruiting trees and would not on account of orchard activities have a reasonable chance of development. Among citrus a summer crop is the most suitable, harvesting and cultural operations being against the success of a winter growth. Where land is liable to "wash," clean cultivation during summer months is inadvisable and the growing of a cover crop calculated to prevent damage by storm waters should be a regular practice. Where slopes are not very defined, cowpeas make an excellent covering and provide a heavy crop for ploughing in. Mauritius and other varieties of beans are also well suited for the purpose, but being particularly vigorous require more attention to keep them from over-running young trees; besides, when developed they are not so easily ploughed in. Although beans and peas have a decided tendency to improve the soil, they are not capable of making good deficiencies, and a liberal fertilising to induce luxuriant growth is most beneficial, for it stimulates both the trees and the cover crop; and, when the latter is ploughed under, such quantities as have been absorbed by it are augmented and returned to the soil. Light soils are generally deficient in humus or quickly become so after cropping and consequently are less capable of retaining moisture or the fertilisers that may have been applied. The deficiencies are reflected in the colour of the foliage, particularly when the trees are carrying a crop, and this in consequence is also affected detrimentally. Unfortunately, the practice of green manuring or maintaining the requisite supply of humus is not general. The illustration depicts the extent of growth attained by cowpea in Mr. T. Allen's orchard (Palmwoods) in light sandy loam.



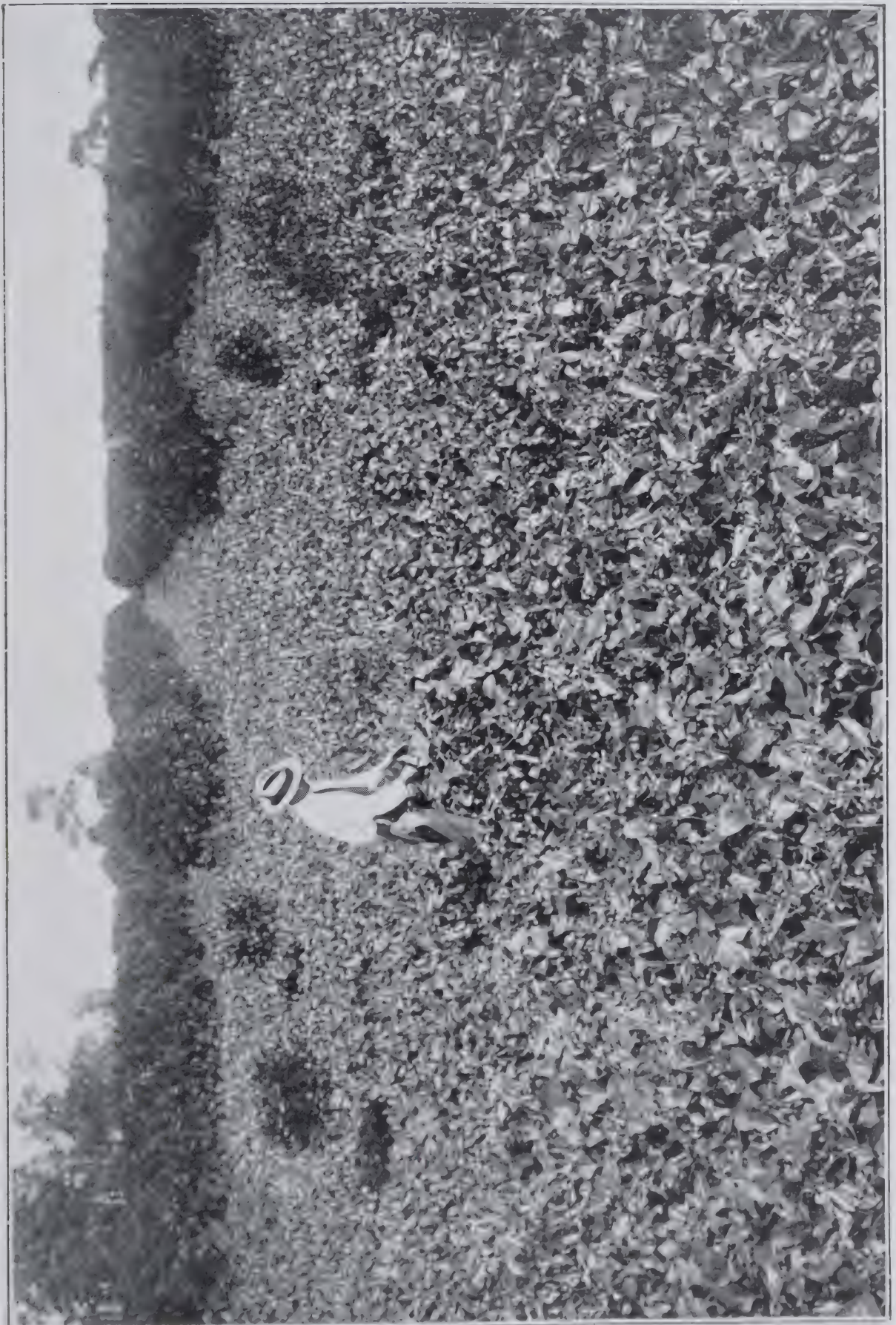


PLATE 151.—Cow PEA, A GREEN-MATURING CROP GROWING IN LIGHT, SANDY LOAM ON MR. T. ALLEN'S ORCHARD, PALAWOODS.



# RURAL ROUTES IN QUEENSLAND.

## THE WORK OF THE MAIN ROADS COMMISSION.

The Sixth Annual Report of the Main Roads Commission, from which the subjoined notes have been abstracted, commends itself strongly to all concerned with rural progress.

As a result of the carefully organised work of the Commission a net of well-constructed arterial highways is spreading gradually over the map. A survey of a year's activities discloses the extent to which the Commission has become a factor in the enrichment of rural life in Queensland.

Through the courtesy of the Commission we are enabled to reproduce herein some of the excellent plates contained in its Report, and which illustrate the value of its general community services.—Ed.

### THE POLICY OF THE COMMISSION.

During the past few years a revolution in transport has been effected in most civilised countries, due to the increased use of the motor vehicle and the construction of better roads. In Queensland we have the experience of good roads having caused increases in traffic of more than 100 per cent. within a few years, and it is proposed to publish the traffic census studies which are in progress, to show the relation between road improvement and volume of traffic, which incidentally brings in its train additional maintenance costs.

The Commission has been subjected to some criticism at times for what has been described as "its piecemeal system of construction." Thinking persons will, however, realise that with the vast mileage of unimproved roads in this State it is not possible to start in some heavily trafficked centres and work continuously outwards to completion with a first-class pavement on any one road. More improvements have been effected where the traffic is densest, but in general the policy has been to take the worst sections of the road and make them as traffickable as possible within the shortest period of time possible. The work done has been of such a standard that it will be capable of progressive improvement from time to time as traffic demands need and give the greatest benefit to the greatest number. The opposite policy, which is advocated by some people, is to start constructing, continuously, high-class pavements, in all directions, radiating from the big centres. The effect of this would be that only a very small proportion of the traffic of the country would receive any material benefit from main roads construction.

Much of the work done to date has involved the construction of the very worst portions of the roads, and consequently the hold-up of traffic on main roads is nothing like so frequent as it was four or five years ago. At the inception of the main roads scheme in 1921 a system of roads—arterial and branch—was mapped and has been added to from time to time, but the endeavour has, all through, been to make a connected system of roads which in the course of time will, it is hoped, in the more closely settled areas, be all paved or all capable of being travelled in all weathers, whilst in the pastoral areas the construction of bridges and floodways will greatly assist transport.

The gazettal and construction of all these roads has been done in fullest co-operation with the Local Authorities of the State. No section of road has been constructed without the proposal having been first fully discussed with the Local

Authority, which in general has been the constructing authority, and the same may be said with regard to the whole planning of the system. Local knowledge has thus been fully availed of. The construction of main roads has stimulated a general improvement in Local Authority works, and road construction throughout the State and main roads methods have been adopted in very many shires, which have now provided modern road plant, thereby reducing the cost of their works and rendering more effective maintenance of their own roads possible.

The motor-car to-day has become such an adjunct to general travel that agitation for construction of trunk and arterial roads has been almost incessant. Considerable



PLATE 152.

JUNGLE SECTION, GORDONVALE-LITTLE MULGRAVE ROAD, GRAVELLING IN PROGRESS.

agitation has existed for the construction of bridges on the South Coast road, between the Queensland border and Brisbane (in order to replace the ferries), and also in other parts of the State. It is understood that one of the Local Authorities obtains about £800 per year from a ferry contractor for the right to charge for the carriage of vehicles, &c., across the river. The ferry facilities are such that during holiday



time vehicles are often required to wait for over an hour. It is now proposed to bridge, at the earliest opportunity, these rivers where crossed by main roads, and plans are in course of preparation with this end in view.

### “SELL OUR SCENERY.”

It cannot be too strongly urged (the Report continues) that the tourist traffic should not be overlooked. The reports of most of the Highway Commissions of America stress this point, and the slogan “Sell our Scenery” is a common one. Some consideration might be given to the provision of funds for tourist roads or tracks in various parts of the State, as such money judiciously expended would be a sound investment in advertising alone. The Main Roads Act makes no provision for purely tourist roads to our national parks.

Proper co-ordination of road and rail services is essential to-day if this country is not to lag behind. The construction of good roads connecting centres of population and leading to railways should do very much towards keeping people on the land. What good roads have done in Victoria is illustrated in the Annual Report of the Victorian Country Roads Board for 1925, which reviews the effect of the roads



PLATE 153.

A LOOP ON PALMWOODS-MONTVILLE MOUNTAIN SECTION.  
Connecting the Montville orchards with the North Coast Railway.

constructed by the Board in Victoria. It is stated that the increase in valuation of Gippsland properties in twelve years amounts to £28,000,000, whereas road construction amounted to £3,340,000 in the same period. Since the construction of the Point Nepean road, the increase in valuation has also been very apparent, having risen from £5,000,000 in 1913 to £13,940,000 in 1925. By Act No. 3425 the Victorian Government now provides £1,000,000 per annum for five years for main roads works, and £150,000 of this shall each year be employed for works in undeveloped mountain areas free of charge entirely to the shires.

The Report contains much useful information and valuable data, including sketch plans and plates showing the several methods of construction adopted by the Commission.





PLATE 154.

FOREST CLEARING ON APPROACHES, BARAMBAH CREEK BRIDGE, GAYNDAH-GOOMERI ROAD.



PLATE 155.

CAIRNS RANGE. SECTION SKIRTING CANEFIELDS, MULGRAVE VALLEY.





PLATE 156.

RAVENSHOE-MOURILYAN ROAD, EVELYN TABLELANDS, NORTH QUEENSLAND, AFTER SEVERAL YEARS OF TRAFFIC. MACADAM WITH LOCAL BINDER.



PLATE 157.

MULGRAVE RIVER VALLEY, SERVED BY CAIRNS RANGE ROAD.



PLATE 158.

BEAUDESERT-LADYBROOK. DEVIATION GRAVELLED NEAR BEAUDESERT.



PLATE 159.

ROMA-MARANOA GRAVEL ROAD.





PLATE 160.  
GAYNDAH-GOMERI, CRUSHED BASALT.



PLATE 161.  
"C" CLASS METAL, GOMERI-CHILDERS ROAD, NEAR BIGGENDEN.





PLATE 162.

LOW-LEVEL BRIDGE, STUART RIVER, WONDAL-PROSTON ROAD.



PLATE 163.

CAIRNS-PORT DOUGLAS ROAD.



### AN AUTOMATIC GATE.

On page 486 of the last (November) issue, a descriptive note, together with sketch plan, kindly supplied by Mr. N. A. R. Pollock, Northern Instructor in Agriculture, of this gate was published. The principle on which it works is the original idea of Mr. Jack Jones, of Britannia Station, near Charters Towers, Queensland. Our plates, for which we are also indebted to Mr. Pollock, illustrate the gate in operation, its simplicity and efficiency.

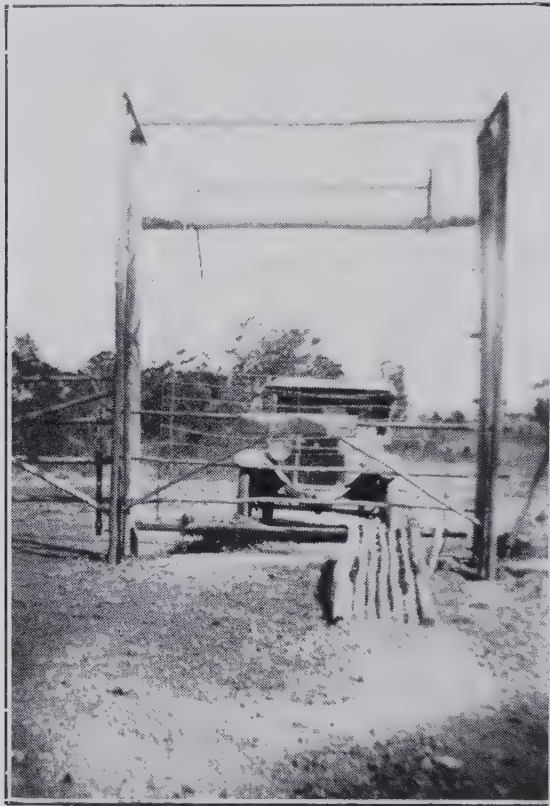


PLATE 164 (Fig. 1).—GATE DOWN; CAR APPROACHING.

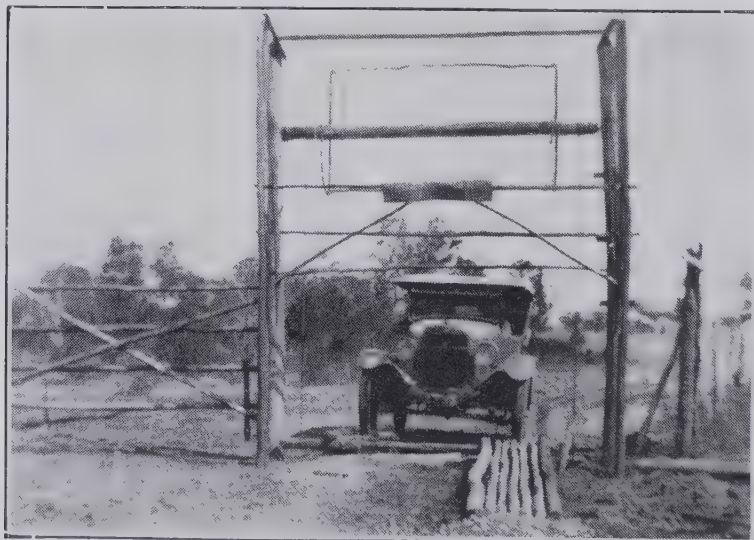


PLATE 165 (Fig. 2).—CAR HALFWAY IN; BEARER COMING UP; GATE RISING.



PLATE 166 (Fig. 3).—CAR STATIONARY UNDER GATE; GATE UP.



PLATE 167 (Fig. 4).—GATE RISEN BY THE WEIGHT OF TWO MEN STANDING ON BEARERS; GATE UP.



RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF OCTOBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING OCTOBER, 1927 AND 1926, FOR COMPARISON.

				AVERAGE RAINFALL.		TOTAL RAINFALL.						AVERAGE RAINFALL.		TOTAL RAINFALL.	
Divisions and Stations.								Divisions and Stations.							
				Oct.	No. of Years' Re- cords.	Oct., 1927.	Oct., 1926.					Oct.	No. of Years' Re- cords.	Oct., 1927.	Oct., 1926.
<i>North Coast.</i>								<i>South Coast— continued :</i>							
				In.		In.	In.					In.		In.	In.
Atherton ... ..		0.89	26	0.59	0	Nambour ... ..		2.94	31	4.37	0.54				
Cairns ... ..		1.84	45	1.72	0	Nanango ... ..		2.28	45	3.38	0.15				
Cardwell ... ..		1.95	53	2.11	0	Rockhampton ...		1.79	40	2.19	0.06				
Cooktown ... ..		1.05	51	0.10	0.06	Woodford ... ..		2.50	40	2.55	0.31				
Herberton ... ..		0.89	40	0.86	0										
Ingham ... ..		1.55	35	1.66	0										
Innisfail ... ..		2.88	46	5.35	0.09	<i>Darling Downs.</i>									
Mossman ... ..		2.73	14	4.22	0.09										
Townsville ... ..		1.26	56	0.45	0.07	Dalby ... ..		2.03	57	2.66	1.16				
						Emu Vale ... ..		2.11	31	4.50	0.76				
						Jimbour ... ..		1.85	39	2.87	1.37				
<i>Central Coast.</i>						Miles ... ..		1.98	42	2.83	0.63				
Ayr ... ..		0.99	40	0.19	0	Stanthorpe ... ..		2.54	54	2.62	0.96				
Bowen ... ..		1.06	56	0.90	0	Toowoomba ... ..		2.55	55	3.16	1.29				
Charters Towers ...		0.68	45	0.35	0.26	Warwick ... ..		2.27	62	2.99	0.80				
Mackay ... ..		1.77	56	1.98	1.22										
Proserpine ... ..		1.74	24	3.25	0										
St. Lawrence ... ..		1.75	56	3.01	0.12	<i>Maranoa.</i>									
						Roma ... ..		1.75	53	2.99	0.22				
<i>South Coast.</i>															
Biggenden ... ..		2.25	28	3.41	1.60										
Bundaberg ... ..		1.99	44	3.01	0.74	<i>State Farms, &amp;c.</i>									
Brisbane ... ..		2.56	76	7.15	0.87										
Caboolture ... ..		2.49	40	2.55	0.96	Bungeworgorai ...		1.52	12	2.12	0.22				
Childers ... ..		2.39	32	4.86	0.51	Gatton College ...		2.05	27	2.84	0.82				
Crohamhurst ... ..		3.39	35	5.74	0.56	Gindie ... ..		1.42	27	2.32	0.00				
Esk ... ..		2.36	40	6.38	0.42	Hermitage ... ..		1.89	20	3.46	0.63				
Gayndah ... ..		2.34	56	4.19	0.43	Kairi ... ..		1.10	12	0.70	0.22				
Gympie ... ..		2.66	57	4.54	0.40	Sugar Experiment		1.56	29	1.86	0.75				
Kilkivan ... ..		2.54	48	5.09	0.60	Station, Mackay									
Maryborough ... ..		2.60	55	7.05	1.05	Warren ... ..		2.14	12	2.58	0.00				

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for October, this year, and for the same period of 1926, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,  
Divisional Meteorologist

WELL WORTH READING.

A Coalstoun Lake's subscriber writes:—"I have been getting the Journal for about fifteen years. . . . I always look forward to receiving it, and consider it well worth reading."

## SOME EXTERNAL PARASITES OF POULTRY.

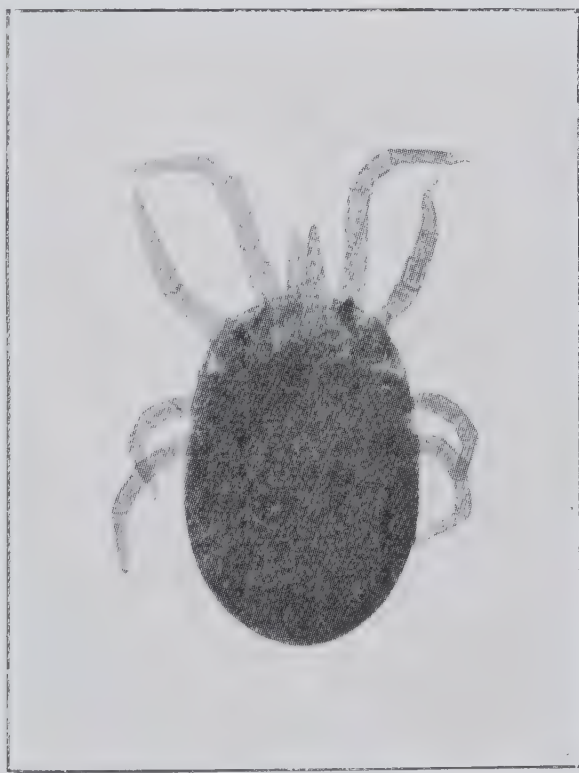
By P. RUMBALL, Poultry Expert.

From the investigation of various troubles affecting poultry one is forced to the conclusion that many breeders do not realise the serious effect that parasites have upon poultry. Parasites not only reduce the egg yield, causing at times the birds to be entirely unprofitable, but so undermine the general health of the birds that the latter become so weakened that they fall ready victims to all classes of disease.

Whenever fowls appear out of condition the first thing the breeder should ascertain is whether they are infected with parasites, and if such is the case, take measures to free the birds.

There are both internal and external parasites of a serious nature to which poultry are subject. An article upon internal parasites appeared in a previous issue of this Journal, copies of which may be had free upon application.

Among the external parasites we have those which live upon the bird itself during the whole of its life and those that live in the poultry buildings during the day, coming out at night to prey upon the birds. Among the latter type of external parasite is the poultry tick and the red mite. The tick is of such a serious nature that it has been the subject of an article also in a previous issue, copies of which are available free upon application.



*From Victorian "Journal of Agriculture."*]

PLATE 168.—RED MITE. (MAGNIFIED 38 TIMES.)

### The Red Mite.

This pest is probably second to the tick in importance as an external parasite. It is only red in colour when engorged with blood; when not engorged it is yellowish, greyish, or almost transparent. It hides by day in the cracks and crevices of the fowl house, nest boxes, &c., living in colonies. Where mites have congregated for a considerable time a mealy dust will be found, and around the crack or crevice of their hiding place will be noticed black and white specks, the excrement of the mite. The red mites usually only feed at night upon the body of the bird, but where infestation is severe they will be noticed upon the broody hen both night and day. The presence of considerable numbers will cause the birds to become droopy, weak, and their combs and faces pale. This is due to the loss of blood and broken rest of the birds. The egg yield, under such conditions, will be materially reduced, and the stock in a fit state to fall ready victims to disease organism. The complete life cycle of the red mite from egg to adult stage takes only seven days, and when this is coupled with the fact that the mite will live for four to five months the rapidity with which they increase will readily be understood.



Treatment consists in preventing the multiplication. In most cases where only a few mite are present they will be found under the perch where it rests on the perch supports. Perches should therefore be moveable and not nailed as is frequently the case. They should also be of timber with as few cracks as possible. Under these conditions it is then possible to lift the perches once a week and treat under them with a suitable preparation for the destruction of the mite. Pure kerosene is very effective, but a heavier oil is to be preferred, such as wood-preserving oil. If infestation is severe the mites may be distributed throughout the whole of the house and even among accumulated droppings under the perch. Under such conditions everything moveable should be removed and all wood work treated, the house thoroughly cleaned of loose earth and droppings, and a good spraying given with a kerosene emulsion to the whole of the interior. Even under this system of treatment some mites will escape, and the practice should be repeated at intervals of a week until the premises are freed from their presence.

To make the emulsion, boil up a pound of good soap in one gallon of water. When boiling remove from the fire and add one gallon of kerosene, stirring well and so thoroughly emulsifying the mixture. To this can be added another eight gallons of water.



From Victorian "Journal of Agriculture."

PLATE 169.—COMMON LOUSE OF THE FOWL. (MAGNIFIED 37 TIMES.)

### Scaly-leg Mite.

The mite which causes this trouble is very common in Queensland, and is responsible for that unsightly scaly leg so frequently noticed among flocks of poultry. Its presence is easily detected when in sufficient numbers to cause trouble. The mite burrows under the epidermic scales on the surface of the leg and upper surface of the feet. The scabs become loosened and elevated by the formation of a whitish crust beneath them and the leg assumes an enlarged, roughened appearance. The trouble runs a very prolonged course, usually beginning between the toes. Unless treated the disease continues to progress and the birds become lame, at times only moving with difficulty; they lose flesh, their plumage lacks lustre, and death may follow from exhaustion.

The mite causing this trouble is known as *Sarcoptes mutans*. It is a strictly contagious disease, although not one that spreads rapidly from bird to bird. Stock hatched and reared by broody hens affected with the trouble rarely escape infestation, while with those artificially hatched and reared, although coming in contact

with infested stock in later life, the trouble does not assume such serious proportions. The mite lives on the juices of the leg, causing irritation and consequently a multiplication of the cells of the part and an exudation of serum, and it is from the union of these two products that the white powdery crust is formed.

Treatment consists in the application of a preparation that softens the scale and destroys the mite. If the legs of birds have been allowed to become very bad they should be washed in warm soapy water. This washing, especially if the leg be scrubbed with an old tooth brush, removes much of the powdery scale. In washing, however, care should be taken not to tear any scab off and cause the leg to bleed. After drying the legs may be treated with a good coat of any of the following:—

1. One part kerosene and two of olive or cotton seed oil.
2. Equal parts sulphur and lard.
3. 6 per cent. carbolic oil.
4. Carbolised vaseline.

The disease is not a difficult one to cure and when once eradicated from the farm, providing the mite is not reintroduced by affected purchases, there is no fear of reinfestation of stock taking place. When infestation is not severe no preliminary washing is necessary if the kerosene and oil treatment is used.

### Depluming Mite.

This mite burrows into the skin near the base of the feathers, causing intense irritation and the feathers to become broken off close to the skin or to be entirely shed. This mite does not suck the blood, but subsists on the waste matters of the skin and feathers. Infected birds usually have a very ragged appearance, and the irritation frequently leads the birds to pluck their feathers and eventually cause the vice of feather eating.



PLATE 170.

This seven-weeks-old Single Comb White Leghorn cockerel is suffering from an attack by head lice. Note the unkempt plumage, dark, dried comb, eyes closed and general dejected appearance.

Treatment.—As the trouble is contagious, affected birds should be dipped and isolated as soon as noticed and the premises or pens disinfected. A suitable dip for this purpose consists of sodium fluoride  $\frac{3}{4}$  oz., flowers of sulphur 2 oz., a good household soap  $\frac{1}{2}$  oz., and one gallon of water. This mixture, as well as curing the trouble, will also destroy all forms of bird lice. If dipping cannot be resorted to several applications of lard and sulphur ointment will effect a cure.

It is, however, not desirable to dip a flock of birds that are in full lay, as the shock will assuredly cause a serious falling off in egg production, and in many cases the moulting of the birds.



**Lice.**

These of various species are more common to poultry than is generally thought, but in small numbers, as a rule, cause very little trouble. There are, however, exceptions, particularly with the head lice that affect chickens. This louse apparently has little effect upon the adult bird, but on chickens it causes heavy mortality. Unlike the majority of the parasites previously referred to poultry lice remain on the fowl constantly. There are many species, and in the great majority of cases those affecting fowls will not be noticed on ducks. Turkeys, pigeons, and geese also have species peculiar to them. Lice are not blood suckers like the mite and tick, but live upon the skin and feathers. Their presence is very irritating when in large numbers, and naturally they are not productive to the good health of the bird.



PLATE 171.—ADVANCED STAGE OF SCALEY LEG.

The general symptoms of lice infestation in chickens are droopiness, lowered wings, and ruffled feathers. In adult birds, with the exception of male birds, ill-effects are not shown, but severe infestation will be reflected by a reduced egg yield. Male birds, however, should be periodically examined for lice. They do not dust bath as freely as females, thereby permitting rapid reproduction of lice and consequently severe irritation. In the breeding pens the presence of lice is largely responsible for the lowered fertility of eggs, and male birds should receive regular treatment with some insect powder.

**The Head Louse.**

This is usually, as the name would indicate, found upon the head of the bird. Heavy losses are caused in young chickens by its presence. It is darkish grey in colour and will usually be found in an upright position along the feathers of the

head portions of the bird. If a careful examination is not made its presence may not be detected on account of its size. A few infesting a chicken will cause the chick to become very droopy in appearance with ruffled plumage and hanging wings, and will, if not treated, eventually cause death. With lice of any description in young chickens it is generally noticed that direct contact with adult stock has at some time taken place, therefore it is strongly advised to prevent this contact if possible.

Treatment lies in the direction of destroying the parasite by lightly smearing the head, neck, and under the lower mandible with salad oil. Do not plaster the chick with oil, a light smear applied with the tips of the fingers will suffice. Naturally if the chickens are mothered by a hen she should also be treated.

Other lice are—

- (1) *The Body Louse*.—This is a large louse which may be noticed moving quickly about the body, particularly around the vent when the feathers are quickly raised. It is of a dirty straw colour, and the eggs are noticed in heavy clusters at the base of the feathers. These eggs hatch in about a week after being laid.
- (2) *The Shaft Louse*.—A small light yellow louse found on the shaft of the feather.
- (3) *Wing Louse*.—A dark grey louse, elongated in shape, found on wing feathers and moves very slowly.
- (4) *Fluff Louse*.—A small louse found among the fluff of birds.

The treatment in all the above cases is prevention. A good dust bath will generally keep lice down to numbers that will cause little or no ill-effect to the birds. This dust bath could be composed of fine road dust and wood ashes. Flowers of sulphur may be added, also a sprinkling of slacked lime, but if the dust is sufficiently fine, and occasionally moistened to induce birds to dust during the warmer weather, it will generally suffice.

## Fleas.

In Queensland the most serious flea to poultryman is unknown. It, however, is common in Western Australia, and every care is being exercised to prevent its introduction into States not troubled with the pest. The flea is termed "Stickfast," and evidently takes its name from its habit of clinging tightly to the head, face, wattles, and lobes of birds. It is a blood-sucking insect, and its presence has been responsible for heavy mortality among flocks in countries where it is known. There are, however, many varieties of fleas in this State, and the writer has noticed fowl yards and houses infested sufficiently heavy to cause inconvenience to the producer concerned.

The thorough cleaning of premises in such cases is recommended and a good spraying with kerosene emulsion. As a general rule a flea lays its egg on the ground. Small grubs hatch from the eggs and undergo a portion of their life on the soil, feeding on organic matter, and from the cocoon stage emerge as fleas, hence the necessity of thorough cleaning of pens.

### A USEFUL AND RELIABLE JOURNAL.

An L.P.A. Secretary (Atherton Tableland) writes:—"I am getting to be an old subscriber now. . . . The Journal is a great help to me in the Secretaryship of the Local Producers' Association here, seeing that it gives all the official information which can be quoted when any subject crops up needing confirmation. The 'Agricultural Journal' gives information to the farmer leaders which can be relied upon for use at farmers' meetings. . . ."





PLATE 172.—THE HOME COUNTRY AND THE DOMINIONS REPRESENTED ON A  
SOUTH BURNETT FARM.

In the group are the Right Hon. L. C. M. S. Amery, M.P. (Secretary of State for the Dominions and Colonies in the British Cabinet) and Mrs. Amery, with their host, the Hon. William McCormack (Premier of Queensland), at a wayside halting place.

In the course of their recent tour through Southern Queensland Mr. and Mrs. Amery and their staff saw something of a dominion in the making. They travelled through some of the most fertile provinces in the whole Empire. On the Darling Downs they saw a limitless sweep of waving wheatfields—a boundless sea of full-eared grain ready for the harvest. On the near North Coast they saw the wealth of our dairy lands; our orchard lands on the ranges, where man's industry and nature's artistry happily combine; banana plantations on buttressing spurs in belts of deep dark green, merging into the lighter shades of sugarfields that spread wide to the ocean's margin—an edging of golden sand and silver surf, the long wash of the blue Pacific. And in the South Burnett they saw a land that had emerged from the primitive to the practical, from rich promise to ripe fulfilment, in a short span of twenty years, and where are exemplified all the fine characteristics of a pioneer people and other strong qualities that go to the making of our race.

## TYRE LIFE—HOW TO PROLONG IT.

Every year, literally, millions of miles of tyre service are lost through the failure of car owners to take care of their tyres.

Once the causes of the effects of the various tyre abuses are fully understood, the care of tyres is really so simple there is no excuse for car owners not getting out of them all the mileage the manufacturers have built into them.

Summarised the more important points for owners to pay attention to if they wish to get full value out of their tyres are:—

(1) Proper pressure, according to the schedules already published, must at all times be maintained, with the possible exception that when one strikes a very soft or sandy patch over which one wishes to drive one's car the pressures may be temporarily reduced in the back tyres, so as to give greater tyre surface in contact with the ground, and, therefore, greater tractive force can be exerted. As soon, however, as one has got out of the soft ground the tyres should be at once pumped up to their correct pressures again.

(2) A reliable tyre gauge is an absolutely indispensable part of a motorist's equipment. It should always be carried on the car, preferably in one of the pockets where it can readily be got at when required. Most makers supply two kinds of gauges—one for high pressure and the other for balloon tyre—and the car owner will naturally procure the kind to correspond with the type of tyres he is using. The tyre gauge should be used on all tyres, including the spare, at least once a week, and if any tyre is found not to be holding its pressure well the cause should be sought for and the defect immediately remedied, either by the owner, if capable, or by a reliable tyre expert.

(3) Correct wheel alignment is absolutely essential for long tyre life, and the slightest signs of tread wear, owing to faulty alignment, should be constantly looked for, and the fault corrected immediately it develops.

(4) Tread cuts, if they make an appearance, must be promptly repaired.

(5) Care in driving, such as in the application of brakes, and in keeping the side walls of the tyres from rubbing against the kerbs, will save many pounds in tyre wear.

(6) Next in importance to the care of the tyres themselves is that of the rims upon which they are mounted.

(7) In the case of motor vehicles which are habitually overloaded so that the total weight borne by the tyres is greater than that for which the makers have made them, these tyres should be replaced by over-size ones, designed to carry such weight.

(8) Last, but not least, see that your spare tyre is always ready to put on the minute that it is required. Never, under any circumstances, run a flat tyre after you have discovered that it is in that condition. If you do so you may easily damage both tube and casing beyond repair.

## PROBLEMS OF MOTORISTS.

Often the anchorage bolts of motor supports work loose, causing annoying squeaks, motor pounding, and inexplicable vibration. Apply lubricating oil to the base of the supports, and pull the bolts up as tightly as they will go, making sure each nut is securely fastened with a cotter pin or lock washer.

### Brake Rods.

The parts under the car that will rattle may usually be located by shaking them. If the brake rods are loose they can be prevented from rattling by supporting them in the centre with a length of coiled spring, properly attached to the frame. If the lubrication grooves in the spring shackle become clogged, the oil may be unable to reach the surface where it is needed. It is often good policy to remove the shackles and run a pipe cleaner or a piece of wire through the lubrication recess to remove all foreign substances and oil or grease. When replacing the shackle bolt thoroughly oil the surface, and if possible rotate it as it is replaced. Many distressing squeaks and rattles may be traced to the improper lubrication of spring shackle bolts.

### Springs.

Unless the springs have been designed for lubrication, they should not be oiled, as they will function better in their original condition. The dry surfaces of the leaves tend to slow the action, and prevent rebound. The Buick Motor Company has sent letters to its dealers and distributors all over the world cautioning them against lubrication of the springs. The Cadillac Motor Company supplies one model equipped with spring gaiters packed with grease, but that chassis is for a special purpose, and is provided with shock absorbers to prevent sudden recovery of the springs.



### Rim Lugs.

Rim squeaks, due to loose rim lugs, may be quickly overcome by applying a small quantity of oil or graphite grease to each lug bolt, and tightening each to its capacity. To be sure of an even tension on the tyre rims, it has been found advisable to tighten the bolts strictly opposite each other, and then to tighten each to its capacity in a clockwise manner. Oiling the bolts and nuts greatly facilitates tyre changing.

### Wheels.

Creaking wheels are often caused by the drying of the wooden spokes. A few drops of kerosene allowed to work into the joints will restore them to proper condition. That suggestion has been handed down from the days when it was a practice to run the carriage into a creek to swell the wheel spokes. The action of the kerosene oil is more lasting, however, than that of water.

### Steering Gear.

Turn the steering wheel from full left to right, lock, and see that all bearings are properly lubricated. Some steering mechanisms are more complicated than others, but if the car is equipped with a Jacox steering gear, such as is used on Cadillac, Oakland, Pontiac, Oldsmobile, and Buick, any backlash which may be the cause of annoying rattles may be easily removed by a slight tightening of the large adjusting nut at the top of the box. The adjusting nut is held in position by a pinch bolt, which must be loosened before an adjustment can be made. After the proper setting has been obtained, the pinch bolt should be retightened, so that the correct adjustment will be maintained.

### TUNING UP A SLUGGISH ENGINE.

Most motorists think it is a most difficult job to undertake to tune up their engines and give them that vim and kick that is associated with the touch of an expert. Its original snap has only disappeared because of valve sluggishness. This is caused by stickiness in the valve guides. Take the valves out; clean the guides and then grind the valves in with the usual valve-grinding compound.

Sometimes it is entirely due to tightness of the valve-stem in the valve-guide, and this particularly applies to the exhaust valve. The material from which modern exhaust valves are made has a tendency to grow under the effect of heat. Closely examine the stem of the exhaust valve, and if there is the slightest appearance of binding, polish the stem by sliding emery cloth up and down; treat the valve-guide in the same manner, and it will be found that the usual snappiness is restored. Should, however, this fail, examine the contact-breaker; carefully clean the points, and see the breaker arm is not sluggish. Sometimes the fibre bearing in which the bell crank works swells, and temporarily grips the breaker arm. This makes for sluggishness that is hard to trace. The moral is: Make all the moving parts of the contact-breaker as free as possible.

Another point to watch is to see the points of the breaker are perfectly clean. With platinum points this is a secondary consideration, but with tungsten points it is of vital importance. Tungsten is a substitute for platinum—unfortunately, not because it is, in any state of form, superior, but because it is cheaper. In use it causes difficult starting and sluggishness, unless the points of the breaker are kept perfectly clean. If you can afford it, use only platinum points.

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### ENTHUSIASTS IN PIG RAISING.

[See opposite page.]

This photograph was taken recently on the occasion of a visit of inspection to the Queensland Co-operative Bacon Association's Factory at Murarrie by a party of boys, recent arrivals in Queensland, under arrangements organised by officials of the Salvation Army. The lads, all of whom are standing in this photograph, are migrants who were at the time undergoing an initial course of training on the Farm Home for Boys at Riverview, near Brisbane, preparatory to their going out as workers on Queensland farms. The officials in the foreground, reading from left to right, are :—Major D. S. Alexander, Superintendent of the Army Farm; Mr. J. Winders, understudy in Mr. Shelton's office; Mr. E. J. Shelton, Instructor in Pig Raising, and Mr. F. Bostock, Assistant Instructor in Pig Raising; the latter gives a series of lectures and practical demonstrations at the Riverview Farm each half year, or as required, and finally conducts an examination at the end of the term. In this way a very useful and practical work is being carried out, the visit to the bacon factory being part of the scheme.



PLATE 173.—GROUP OF INTERESTED ENTHUSIASTS IN PIG RAISING.





PLATE 174.—ENTHUSIASTIC MEMBERS OF THE MERLWOOD-CLOYNA DISTRICT PIG CLUB, 1927.

It will be noted that girls as well as boys, and children of varying ages, are interested in this progressive scheme, and that they are all believers in "Better Pigs on Every Farm." The photograph was taken on the occasion of a Club visit to the home of two Club members, at Messrs. H. Shelton and Sons' Farm, Merlwood. The two larger pigs were entered in the Club contest. Note also the clean, healthy surroundings, such as is necessary in all branches of stock raising, and the fine, healthy enthusiastic



PLATE 175.—THE JOINT COMMITTEE AND JUDGES OF THE PIG CLUB, MERLWOOD-CLOYVA DISTRICT, QUEENSLAND.

All enthusiasts in Pig Club and other progressive schemes for the advancement of the district. This photograph was taken on the occasion of the Club contest in April, 1927. The same Committee was responsible for organising another equally important contest in 1928, and is associated with a combined Pig Club Show and School Fête were held at



## A TON OF PORK IN SIX MONTHS FROM ONE LITTER.

### AN AUSTRALIAN RECORD.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

Just what does it mean when we refer to "A Ton of Pork in Six Months from one Litter" and when we refer to it as "An Australian Record?" It means just simply that the total live weight attained by this sow's litter of pigs—all but one of the pigs reared from the one farrowing—when less than 180 days old, scaled more than what we commonly accept as one ton, i.e., 2,240 lb., frequently in the trade called a "long ton" (as against 2,000 lb. spoken of as a "short ton" when dealing with the weight of pollard and other concentrates).

The litter of Gloucester Old Spot pigs to which reference is made in this report have created a new Australian record in this direction by attaining a total live weight—eleven pigs in the litter—of 2,314 lb. at the age of 23 weeks and 3 days, or approximately one week or more short of six months.

Writing in regard to this record-breaking litter, the breeders, Messrs. Russell and Johnston, of "Breachin," Bete Bolong, Orbost, Victoria, have this to say:—

"The particulars we send you herein are the records of the weights, gains, &c., and the rations used in producing our Gloucester Old Spot Ton Litter in under six months. We think you will agree that this performance is a feather in the cap of this old world breed. We would very much liked to have had the opportunity of showing you the litter, for we are sure you would have been very enthusiastic over them. The Better Farming Train was in Orbost last week (October, 1927) and by special request we penned the pigs in the railway yards. Mr. Archer and his fellow-officers from the Victorian Department of Agriculture were very interested, and the former went so far as to say in his lecture that the Gloucester Old Spot breed would cross very well with the large White Yorks."

The special report which follows, supplied by Mr. J. Cowper-Johnston, a partner in the firm, details the methods followed, foods used, and results obtained. We pass this information on for the benefit of readers generally.

NOTE.—This record compares very favourably with what is referred to in America as the "World's Record Litter" of pigs—seventeen pigs in all in one litter which when 180 days old weighed 5,117 lb. They were Poland-Chinas, bred and fattened on the farm of the W. T. Rawleigh Company, Freeport, Illinois, U.S.A., and to which previous reference has been made in this Journal.—Ed.

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### A GLOUCESTER OLD SPOT TON LITTER.

In producing a Ton Litter within six months, the object in view was if possible to give prominence to the many very excellent qualities of the Gloucester Old Spot breed of pigs. It is rather unfortunate that having been successful, the swine fever restrictions should prevent the publicity which exhibiting at the Melbourne Show or offering for sale in the open market would have secured. However, the accompanying records of weights, gains, and the rations used during the twenty-three weeks should give a very good idea of what the breed is capable.

Although the Gloucester Old Spot is the first breed to produce a Ton Litter in Australia, it must not be thought that it is the only breed that is capable of such a record; other breeds can, and no doubt will, emulate the Gloucester Old Spot, but they will have difficulty in beating the litter in question, the type, conformation and quality of the whole eleven pigs being of such an exceptionally high standard.

The conditions under which the experiment was carried out were far from ideal. Wintry weather was experienced with extraordinary frosts day after day, raw bleak days and  $7\frac{1}{2}$  inches of rain in a week retarded progress and, of course, increased the amount of food consumed. Again, the loss of No. 95 increased the length of time taken to produce the ton and helped to raise the cost of producing it. The late castrating of the boars must have also helped to keep the litter back. It was at first intended that the boars should be kept, but when it was realised that they might interfere with the experiment they were operated on.

There is no doubt that given more favourable conditions the cost per pound would be considerably reduced and the time taken shortened.

Much has been heard in Victoria of the quality of the pollard supplied to many pig raisers. In this case, the pollard was obtained from three different sources. The results show plainly the quality of the article supplied. It might be as well

to mention here that although the dam of the litter was able to consume a relatively large amount of bran and to good effect, this is not so with all sows; in fact, many are unable to digest a quarter of the amount quoted.

That the Gloucester Old Spot pig is an ideal one for the farmer is undoubted, and it is certain that when the breed is better known it will become very popular with farmers. Gloucester Old Spot pigs are exceptionally hardy, very quiet, and good feeders, giving a maximum of gain at a minimum of cost. The sows are excellent mothers, producing and rearing large litters of great size. Piglets weighing 6 lb. at birth are quite common. The boars are exceedingly potent, and when used on any of the other breeds the resultant cross is a most taking one. No breed of pigs causes less trouble on the farm, a very poor fence will hold them and the boars cause no trouble. A strong point in favour of either the pure Gloucester Old Spot or the cross is, that if fed right and kept going from birth, they mature very early and consequently are very suitable for the butcher as well as for the curer, and they weigh exceptionally well.

Some critics say that the bone of the Gloucester Old Spot pig is heavy and coarse. This is far from being a fact, and an outstanding feature of the Ton Litter, apart from its conformation, is the quality and fineness of the bone.

That the breed has excellent bacon qualities is borne out by the results in the recent competitions in England. For the second year in succession the Gloucester

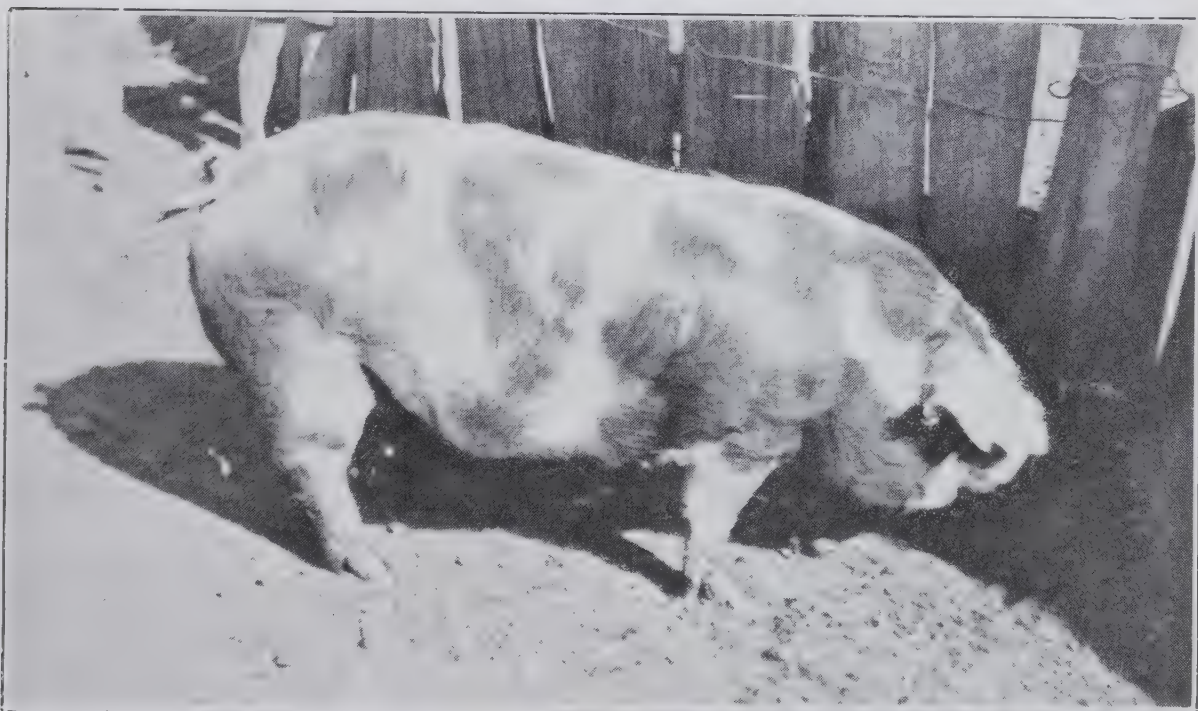


PLATE 176.—GLOUCESTER OLD SPOT SOW, NO. 87 IN TON LITTER, WHEN TWENTY-THREE WEEKS AND THREE DAYS' OLD. LIVE WEIGHT, 246 LB

Note compact deep body, deep and capacious chest and broad meaty ham. Though less than six months' old she has exceeded prime bacon pig weight by almost 70 lb. It pays to breed and feed the best and the best only. Mongrels would not attain this weight in eighteen months if they attained it at all. The departmental slogan, "Breed more and better pigs on every farm," is strikingly evidenced in this picture.

Old Spot breed won the Whitley Cup for the best bacon from six pigs, with 100 marks. Again, in the Beale Cup, a class for two pedigreed pigs, in which four Large White Yorks, one Berkshire, and two Gloucester Old Spot entries competed, the "Spots" took first and second places with 98 and 86 marks respectively. Surely a breed that can put up a performance such as this must be worthy of a place in helping to build the export bacon trade to England, which we are told is so essential to the pig-raising industry of Australia.

In conclusion, it may be said that if there is one thing more than another to be learnt from raising the Ton Litter, it is that rearing pigs is a payable proposition when they are fed right and kept going from start to finish. The practice of rearing pigs and just letting them grow till they reach bacon stage and then fattening them is, apart from the resultant inferiority of the meat, a most expensive one and must, in most cases, cost more to produce than is realised for the finished article.



## PARTICULARS OF RATIONS FED TO G.O.S. (TON) LITTER AND DAM.

Weeks.	—	Pollard.	Barley.	Barley.	Milk.	Remarks.
		Lb.	Lb.	Lb.	Gal.	
1	Sow .. Litter* ..	35 ..	21 ..	.. ..	35 ..	Pollard soaked in water, making with milk one kerosene tin night and morning.
2	Sow .. Litter* ..	35 ..	21 ..	.. ..	35 ..	
3	Sow .. Litter ..	35 ..	21 ..	.. ..	35 ..	Suckers commenced sampling sow's ration at 3 weeks old
4	Sow .. Litter ..	73 ..	28 ..	.. ..	35 ..	Suckers allowed run in yard, progress not satisfactory, weather exceptionally cold, heavy frosts.
5	Sow .. Litter ..	73 10	28 ..	.. 28	35 7	Barley brought to boil and allowed to steam, ration mixed with milk and pollard and fed middle day apart from sow.
6	Sow .. Litter ..	73 21	28 ..	.. 28	14 14	
7	Sow .. Litter ..	73 42	28 ..	.. 42	14 28	Pollard fed night and morning, barley middle day.
8	Sow .. Litter ..	73 42	14 ..	.. 42	14 28	
9	Sow .. Litter ..	73 111	14 ..	.. 56	14 28	Suckers looking for more; benefit of increase is shown in gain for tenth week.
10	Sow .. Litter ..	63 122	.. ..	.. 70	14 91	{ Suckers shut off from sow part of day and allowed run in patch of lucerne. Scoured very badly and lost weight so reduced barley and cut out lucerne.
11	Sow .. Litter ..	63 122	.. ..	.. 70	14 91	
12	Sow .. Litter ..	63 131	.. ..	.. 70	14 91	Litter only allowed with sow nightly.
13	Sow .. Litter ..	63 131	.. ..	.. 70	14 91	
14	Sow .. Litter ..	.. 192	.. ..	.. 70	.. 98	Weather very hard; frost almost daily; litter weaned.
15	Sow .. Litter ..	.. 192	.. ..	.. 98	.. 98	Very wet week; 7½ inches of rain.
16	Sow .. Litter ..	.. 245	.. ..	.. 98	.. 98	Litter also receiving half-tin maize cobs middle day.
17	Sow .. Litter ..	.. 270	.. ..	.. 98	.. 110	

\* Litter suckling sow only.

PARTICULARS OF RATIONS FED TO G.O.S. (TON) LITTER AND DAM—*continued*.

Weeks.		Pollard.	Bran.	Barley.	Milk.	Remarks.
		Lb.	Lb.	Lb.	Gal.	
18	Sow .. Litter ..	.. 251	.. ..	.. 98	.. 101	No. 95 pig died previous week. Pigs unable clean up, so ration reduced.
19	Sow .. Litter ..	.. 251	.. ..	.. 98	.. 101	Extra half-tin maize given at night.
20	Sow .. Litter ..	.. 332	.. ..	.. 98	.. 140	Pigs could not manage extra maize, so it was cut out of mid-day feed.
21	Sow .. Litter ..	.. 332	.. ..	.. 98	.. 140	
22	Sow .. Litter ..	.. 332	.. ..	.. 98	.. 140	Several of the sows in litter in season and it was rather a wet week, so results were not quite up to the mark.
23	Sow .. Litter ..	.. 332	.. ..	.. 98	.. 140	Ton litter realised.
24 weeks and 3 days	Sow .. Litter ..	.. 141	.. ..	.. 42	.. 62	Litter finally weighed 26th September by Mr. Bird and an officer from the Department of Agriculture, Melbourne, Vic.
25	Sow .. Litter ..	.. ..	.. ..	.. ..	.. ..	
	Totals..	4,397	203	1,427	1,947	

## COST OF FOOD PURCHASED STATED AT MELBOURNE PRICES.

	£	s.	d.
Pollard, 4,397 lb. at 1s. 9d. per bushel .. .. .	19	4	9
Bran, 203 lb. at 1s. 8d. per bushel .. .. .	0	16	11
Barley, 1,427 lb. at 4s. 6d. per bushel .. .. .	6	8	3
Milk, 1,947 gallons at 1d. per gallon .. .. .	8	2	3
Maize (cobs), 5 bags at 7s. per bag.. .. .	1	15	0
	£36	7	2

Total cost of producing 2,314 lb. of pork (including keep of sow) for 13 weeks £36 7s. 2d., as per figures supplied by Messrs. Russell and Johnston, "Brechin," Bete Bolong, Orbost, Vic.



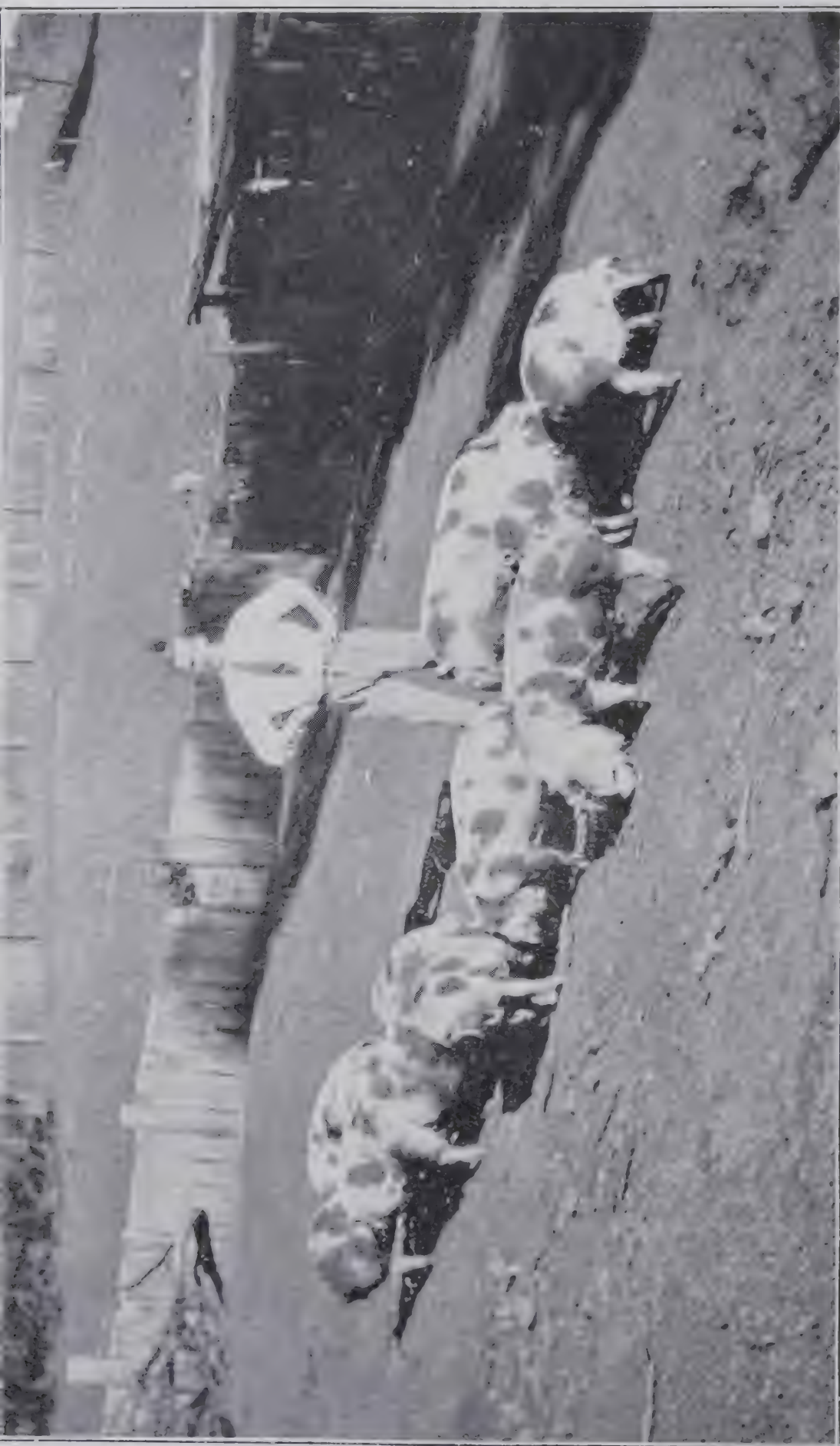


PLATE 177. THE RECORD-BREAKING LITTER OF GLOUCESTER OLD SPOT PIGS, THE PROPERTY OF MESSRS. RUSSELL AND JOHNSTON, OF "BRECHIN," BETE BOLONG, VICTORIA.

This litter of pigs weighed under Government supervision at twenty-three weeks and three days' old, live weight, 2,314 lb. The photograph, in which the mother of the pigs is shown, was taken when the pigs were sixteen weeks' old or some seven weeks before the completion of the test. This is the first occasion in Australia on which a ton litter has been produced under similar conditions under six months of age.



PLATE 178.—GLOUCESTER OLD SPOT SOWS, NOS. 87 AND 90, MEMBERS OF THE TON LITTER, AT SIXTEEN WEEKS OF AGE.  
Note exceptional quality, evenness of type, length of body, and plump well-filled hams. Pigs of this quality would realise top price in any market. They are certainly exceptionally well developed animals for their age.



PARTICULARS AND WEIGHTS OF GLOUCESTER OLD SPOT LITTER.  
Farrowed, 14th April, 1927; Number in Litter, 14; Number Reared, 12; Average at one day old, 3.68 lb.  
Dam—"Brechin Faith," No. 38.  
Sire—"Brechin Pride," No. 41 (A.S.P. Herd Book).

Earmark and Sex of Pigs.	WEEKS.											
	1	2	3	4	5	6	7	8	9	10	11	12
No. 87 Sow ..	Lb. 7.0	Lb. 13.0	Lb. 18.5	Lb. 24.0	Lb. 31.75	Lb. 37.5	Lb. 43.5	Lb. 54.0	Lb. 64.75	Lb. 77.0	Lb. 88.75	Lb. 96.5
No. 88 Sow ..	7.75	12.0	17.5	21.75	29.0	33.5	41.0	45.5	55.5	65.25	73.0	84.25
No. 89 Sow ..	4.5	8.25	12.0	15.0	18.5	22.5	28.0	35.0	44.5	54.25	63.0	68.5
No. 90 Sow ..	6.0	10.5	14.0	18.0	25.5	30.5	37.0	42.0	54.0	53.5	72.5	86.5
No. 91 Sow ..	7.75	8.0	11.5	13.25	18.75	21.0	25.0	31.0	36.5	46.5	57.0	67.0
No. 92 Sow ..	7.75	13.5	18.0	21.0	27.0	33.0	38.0	44.5	52.0	63.0	74.0	81.5
No. 93 Sow ..	6.5	9.5	14.0	16.0	22.5	26.0	31.25	36.0	43.0	53.0	59.5	70.5
No. 94 Boar ..	8.0	12.5	17.5	21.0	27.75	32.5	41.0	44.0	53.75	65.0	77.5	79.5
No. 95 Boar ..	5.0	9.75	13.0	15.5	21.5	24.0	25.25	35.0	35.0	45.0	53.0	58.5
No. 96 Boar ..	6.25	11.0	16.0	19.0	24.5	29.5	34.5	36.75	45.5	56.5	65.5	76.5
No. 97 Boar ..	8.0	12.5	17.0	19.5	26.75	31.5	35.0	33.5	39.0	47.25	62.5	73.0
No. 98 Boar ..	6.0	10.0	12.5	14.0	18.5	22.0	27.5	32.5	40.75	50.5	61.5	63.0
Total Weight ..	80.5	130.5	181.5	218.0	292.0	343.0	407.0	469.75	564.25	659.75	807.75	905.25
Average Weight ..	6.7	10.87	15.12	18.16	24.33	28.6	33.93	39.14	47.02	57.47	67.31	75.43
Average daily Gain in Weight ..	..	4.11	4.29	3.04	6.16	4.29	5.29	5.22	7.57	10.41	9.75	8.12

## PARTICULARS AND WEIGHTS OF GLOUCESTER OLD SPOT LITTER—continued.

## WEEKS.

Earmark and Sex of Pigs.

	13	14	15	16	17	18	19	20	21	22	23	24 and 3 days.
No. 87 Sow ..	Lb. 111.5	Lb. 125.5	Lb. 131.5	Lb. 148.0	Lb. 159.5	Lb. 171.0	Lb. 187.0	Lb. 200.5	Lb. 217.0	Lb. 222.0	Lb. 235.0	Lb. 246.0
No. 88 Sow ..	..	91.5	110.5	118.5	128.5	142.0	155.0	167.5	178.0	191.0	207.5	215.0
No. 89 Sow ..	..	82.0	102.5	111.0	121.5	132.5	145.0	157.5	171.0	182.5	196.0	201.0
No. 90 Sow ..	..	95.5	112.5	133.5	150.0	162.5	177.0	186.0	191.0	203.5	211.5	221.0
No. 91 Sow ..	..	77.0	87.0	106.5	115.5	123.0	136.0	149.0	161.0	169.0	180.0	187.0
No. 92 Sow ..	..	92.5	103.5	124.0	136.0	149.0	164.0	173.0	185.0	196.0	210.0	213.0
No. 93 Sow ..	..	77.0	89.5	98.5	123.0	133.5	150.0	163.5	178.0	187.0	203.0	204.0
No. 94 Boar ..	..	91.0	107.0	114.5	136.5	147.0	162.0	177.5	191.0	200.0	213.0	220.0
No. 95 Boar ..	..	61.5	52.0	61.0	..	..	..	..	..	..	..	..
No. 96 Boar ..	..	84.0	97.0	116.0	125.5	135.0	144.5	159.5	172.0	177.0	185.0	192.0
No. 97 Boar ..	..	81.5	96.5	118.5	130.0	141.0	158.0	172.5	187.0	198.5	210.0	215.0
No. 98 Boar ..	..	75.0	87.0	106.5	116.5	128.0	141.0	155.5	172.0	184.0	195.0	200.0
Total Weight ..	..	1,020.0	1,146.0	1,251.0	1,382.0	1,442.5	1,564.5	1,716.5	2,003.0	2,110.5	2,246.0	2,314.0
Average Weight ..	..	85.0	95.53	104.25	115.18	131.0	156.04	169.27	182.09	191.86	204.18	210.36
Average daily Gain in Weight ..	..	9.56	10.5	8.75	10.91	11.04	11.09	13.22	12.82	9.77	12.31	6.18



## DAILY NOTES ON VARIOUS PIGS AS NUMBERED ON EAR TAGS.

1. Piglets allowed out of sty, exceptionally cold week (fourth week).
2. No. 95 showed signs of rupture, third week.
3. No. 97 attack of scours seventh and eighth week.
4. All boars were castrated, tenth week.
5. Suckers shut out from sow part of day from tenth week.
6. Suckers only allowed with sow at night from twelfth week.
7. Suckers weaned fourteenth week.
8. Very wet and cold weather ( $7\frac{1}{2}$  inches of rain) fifteenth week.
9. No. 95 suffered from attack of worms fourteenth week.
10. No. 95 injured while being weighed, sixteenth week, and died seventeenth week.
11. No. 90 lame twenty-first week.
12. Several sows in season, wet and cold, twenty-second week.
13. Litter was allowed run in patch of lucerne twelve weeks, scoured very badly, in some cases losing weight to extent of 6 lb. in three days. Cut lucerne out and reduced ration.
14. The litter was finally weighed on Monday, 26th September, by Mr. J. Bird, of Messrs. James and Bird, Stock and Station Agents, in the presence of an officer from the Department of Agriculture, the total weight being 2,314 lb., the age 23 weeks and 3 days.

Owners and Breeders: Russell and Johnston, "Breechin," Bete Bolong, Orbost, Victoria.

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## MAIZE IMPROVEMENT.

### FIELD WORK OF THE DEPARTMENT.

By C. J. McKEON, Assistant Instructor in Agriculture.\*

Practically the whole of the year was devoted to work connected with the Departmental seed maize improvement scheme. Although the season was somewhat unfavourable for maize-growing, some very good yields were obtained, and large stocks of selected seed were secured for distribution.

The early part of the season was very dry, very little rain being registered until December, and the early sown crops suffered in consequence. During the latter part of December, and practically the whole of January, very heavy rains were experienced throughout the maize-growing districts, and considerable damage was caused by floods and consequent water-logging of certain classes of soil.

The floods also had the effect of delaying the planting of the late crop, which usually takes place during December, and, as a result, many of the crops in some localities were either wholly or partially spoiled for grain purposes by frosts.

It is gratifying to again be able to report on the improvement in type and yield, and also on the increasing popularity of the departmental varieties, which is shown by the increasing demand for seed, and in the number of successful exhibits at the last National Show which were grown from seed purchased from this department.

It is also satisfactory to observe that the departmental maize improvement work is receiving greater interest from growers, both within and without the State. Inquiries from other countries for stud seed have also been received. Some assistance in this latter respect has been given to the New South Wales Department of Agriculture, which secured supplies of seed for two years in succession of one particular variety—Funk's 90-Day; the standard of quality of our strain of seed now being fairly high as a result of successive years of seed selection work.

The Northern seed maize improvement work, which was started this year with the idea of evolving a suitable type of grain for the Atherton Tableland, has created a considerable amount of interest in that district, and the results so far have been more than satisfactory. The new variety (Durum), on which this Department has been working for some years, gave very promising results, and the type and quality of the grain was very favourably commented on by leading maize-growers in that district.

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\* In the Annual Report, Department of Agriculture and Stock, Q.

### SEED MAIZE IMPROVEMENT.

Fairly large areas of the following standard varieties were sown in Southern Queensland—viz., Improved Yellow Dent, Golden Beauty, Star Leaming, Reid's Yellow Dent, Funk's Yellow Dent, and Funk's 90 Day. Although a number of the plots were failures more or less through dry weather, and also later by reason of excessive rain and floods, a large quantity of seed was secured, which, after grading, was sufficient to plant over 3,000 acres. Both type and quality were excellent. During the early part of the season considerable damage was done to several crops by cutworms, and in two instances plots of 3 and 5 acres were completely eaten out.

The damage caused by the maize grub was again very slight. This applies also to weevil, no crop showing damage of any consequence, and it is doubtful if as little damage was done during any previous season. Although the necessity of picking the cobs as soon as possible, particularly those ripening early in the season, has always been impressed on the growers, this could not be altogether responsible for the small amount of damage, for in previous seasons crops have been attacked long before they were fit to harvest. It is thought that the very heavy rains during December and January may have had some effect in checking weevil attack.

Twenty-seven plots, totalling 146½ acres, were sown with varieties named as follows:—

Improved Yellow Dent, 36 acres; Golden Beauty, 19 acres; Star Leaming, 22 acres; Reid's Yellow Dent, 21½ acres; Funk's Yellow Dent, 6 acres; Funk's 90 Day, 36 acres; Eight-row Flint, 4 acres; Cuban Yellow Flint, 2 acres. Total, 146½ acres.

Of these, nine plots totalling 49½ acres were spoiled by floods and excessive rain, two plots totalling 7 acres were completely destroyed by cutworms, and two totalling 20 acres through lack of cultivation and attention on the part of the grower.

#### **Funk's 90 Day.**

This is an extremely popular variety and has proved to be a splendid yielder. Five plots were sown, but only one plot of 11 acres and another of 2 acres were harvested, the balance being destroyed by floods and cutworms. The large plot of 11 acres was sown in two areas, one of 9 acres and another sowing of 2 acres a fortnight later. The former received a check from dry weather and rain fell when tasselling was nearly finished. The yield was slightly over 60 bushels per acre. The later sowing received the rain at the right time and gave the very fine yield of 85 bushels per acre.

The field characteristics were very good and continue to show improvement, particularly in the husk covering and evenness in ripening. The type and colour of grain were excellent, and it would appear that as a result of careful selection of stud seed the small percentage of reddish-tinted grain has been practically eliminated. Large stocks of very nice quality seed were secured.

An ear-to-row test plot was planted with the first sowing of the propagation plots and, considering the weather conditions, the results were good. The lowest yield recorded was 47.3 bushels per acre, whilst the highest yield reached 79.3 bushels per acre.

#### **Star Leaming.**

Most of the plots of this variety suffered from dry weather during the tasselling period, and although none of the yields was heavy, all gave fairly good results and some very good quality seed was secured. The best yield was between 65 and 70 bushels per acre. The yields of the other plots were not taken owing to damage by cutworms and parrots. The type of grain was very even and the field characteristics were also very good.

An ear-to-row test plot was sown twice, but was destroyed by kangaroo rats on each occasion.

#### **Reid's Yellow Dent.**

Four plots were sown with this variety and only small portions of two of these were harvested, the balance, including the ear-to-row test plot, being destroyed by flood waters. These were all well advanced and were very promising looking, one plot in particular which was nearly ready to harvest would have given an exceptionally heavy yield. About 2 acres in one plot and 1 acre in another were on higher land and were only partly damaged. These were harvested and a fair quantity of seed was selected. Owing to the amount of damage done, no yield records were obtainable.

#### **Funk's Yellow Dent.**

Both plots of this variety were also practically destroyed by floods and only about 20 lb. of seed for further plot work was secured.



**Improved Yellow Dent.**

Owing to being sown later in the season the crops of this variety were not so far advanced and therefore did not suffer so severely from floods as the earlier maturing varieties. Two small plots were washed out, but the balance did very well, and although some of them were completely covered with water for some days they soon recovered. Two plots in particular developed very well and yielded in the vicinity of 85 bushels per acre. The type and colour of the grain were very good, and it is considered that the seed of this variety was the best so far selected from the standpoint of quantity and evenness of type. Field characteristics, with the exception of the height of the ears, were very good. With regard to the latter there is still room for improvement. Ears on the whole were very large, and a considerable number of particularly good ears were secured for show purposes. The results from the ear-to-row test were very satisfactory, the highest yield recorded being 94.4 bushels per acre and the lowest 67.3 bushels per acre. The average yield for the sixteen rows was 81.57 bushels per acre.

**Golden Beauty.**

Only one plot was good enough for seed purposes, the others being too poor because of the heavy rains; only a limited quantity of seed was therefore available. This, as is usual with this variety, was very even in type and colour. Portion of the crop yielded very well, but the yield for the plot was only about 60 bushels per acre owing to a portion of the land being very rough at the time of planting and the crop made poor growth on this portion. The ear-to-row test plot was completely destroyed by inundation of the land on which it was sown.

**Other Varieties.**

Two small areas were sown with Flint varieties, and a quantity of seed was selected from one of these for further trial. The other plot was a failure owing to being sown too late in the season.

**Northern Seed Maize Improvement Scheme.**

This scheme was initiated last season at Burnside, Tolga, the variety used being Durum—a variety on which the Department has been working for some years with a view to producing a type of grain to suit the climatic conditions existing on the Atherton Tableland. A large area was sown, and the results so far are very pleasing. The crop was badly flattened by a cyclone when out in tassel, but made a very good recovery and developed a good yield. The husk covering and position and direction of the ears were splendid, the type of grain being very good.

**“EAR TO ROW” TESTS—IMPROVED YELLOW DENT.**

Row No.	Yield per Acre.			Row No.	Yield per Acre.		
	Bushels.				Bushels.		
401 x 283	..	..	92.25	401 x 290	..	..	92.25
401 x 284	..	..	71.75	401 x 291	..	..	78.30
401 x 285	..	..	74.67	401 x 292	..	..	81.26
401 x 286	..	..	74.67	401 x 293	..	..	77.60
401 x 287	..	..	84.10	401 x 294	..	..	75.41
401 x 288	..	..	84.10	401 x 295	..	..	93.71
401 x 289	..	..	67.35	401 x 296	..	..	92.98
Check	..	..	70.28	401 x 297	..	..	94.44

Sown, 8-12-26; germinated, 13-12-26; tasselled, 10-2-27; ripened, 22-6-27; period of maturity, 191 days; highest yield, 94.44 bushels; lowest yield, 67.35 bushels; yield from check row, 70.28 bushels; average for plot, 81.57 bushels.

**FUNK'S 90 DAY—1926-27 SEASON.**

Row No.	Yield per Acre.			Row No.	Yields per Acre.		
	Bushels.				Bushels.		
413 x 51	..	..	61.8	413 x 61	..	..	61.03
413 x 52	..	..	55.69	413 x 62	..	..	70.19
413 x 53	..	..	57.95	413 x 63	..	..	47.30
413 x 54	..	..	56.46	413 x 64	..	..	58.74
413 x 55	..	..	63.32	413 x 65	..	..	61.03
413 x 56	..	..	72.48	413 x 66	..	..	68.66
413 x 57	..	..	67.90	413 x 67	..	..	68.66
413 x 58	..	..	55.69	413 x 68	..	..	54.93
413 x 59	..	..	79.34	413 x 69	..	..	63.32
413 x 60	..	..	63.32	413 x 70	..	..	70.19
Check	..	..	57.98				

Sown, 6-10-26; germinated, 11-10-26; tasselled, 26-11-26; ripened, 31-1-27; period of maturity, 112 days; highest yield, 79.34 bushels; lowest yield, 47.30 bushels; yield from check row, 57.98 bushels; average for plot, 62.66 bushels.



PLATE 179.—LOCAL FARMERS AND OTHERS PRESENT AT THE MCCORMICK-DEERING TRACTOR SCHOOL, HELD RECENTLY AT MILLMERRAN.



## FARM TRACTORS.

By E. T. BROWN.\*

The majority of tractors are fitted with two or three forward speeds and reverse. When ploughing on heavy land, it is advisable, as a general rule, to run the outfit on low gear, but when performing other land work, such as harrowing, disking, rolling, &c., the second gear can be used profitably. It is only when running on the road that the top gear is employed. Whenever starting away from rest, however, the low gear must be engaged first; a change is then made to second, and, finally, to top gear if required. To start from rest, the clutch must be disengaged and held in this position until the pinion wheels in the transmission gear have come to rest. Then the gear lever is pushed or drawn into the correct position for the intermeshing of the first speed pinions. The clutch is then allowed to engage slowly. Changing low to second or second to top must be done when the pinion wheels are in motion. Declutch, then bring the gear lever into neutral, pause a moment, then place into second or top position. Come down in the same way. Before reversing, the engine must be brought to a standstill.

### Accelerating.

The speed of the tractor outfit is governed by the amount of combustible mixture supplied to the cylinders. This is regulated by a throttle. When starting away from rest, the throttle must be opened enough to enable the machine to get away, but so soon as a movement is made the throttle should be opened until the desired speed is attained. The practice of accelerating quickly, which is so common, is a bad one, especially when the ground is heavy or the load considerable. The throttle should always be opened slowly, since the sudden increase in the supply of the mixture is bound to put an additional strain on the engine and transmission. I do not mean to infer that any considerable length of time should elapse before the throttle is fully opened, but that all jerky movements should be avoided.

### The Speed to Travel.

Taking the life of the tractor into consideration, the question of speed is a very important one. There is always a great tendency for a driver to try to get as much speed out of his engine as possible, especially when that engine is a powerful one. It is difficult to conceive of a greater mistake. There is nothing that damages a tractor more, eventually ruining it, than over-driving. When ploughing, it is quite sufficient to work at  $1\frac{1}{2}$  m.p.h. to  $2\frac{1}{2}$  m.p.h., according to the nature of the soil, depth of ploughing, and power of the outfit. To run at a speed greater than that intended by the designer means incalculable damage to the outfit. The added strain will show itself by rapid wear and tear of the working parts, even if it does not result in the direct breaking of some vital part of the machine.

### Don't Stint the Oil.

It seems to be more or less customary among a great many farmers not to use oil until the squeak becomes penetrating. But this trait will have to be overcome if the tractor is to be maintained in good working order. True economy in tractor running lies in the constant use of oil on all working parts, not forgetting that the base of the engine requires attention as well. Purchase the best oil procurable, see that it is especially prepared for internal-combustion engines, and without wasting it, use it liberally. This will save pounds on depreciation in the course of a year.

### The Oil Level in the Gear-Box.

The transmission gear in the majority of tractors is enclosed in a special case, and the gear wheels run in an oil bath. It is not necessary to inspect the gear-box frequently, but a point should be made of doing so, say, every three months. If it be noticed, however, that the oil is leaking out of the casing, it should be examined more often. To obtain the best results—that is, silent and easy running—the level of the oil should be sufficiently high to reach to the centre of the highest shaft in the box. Special gear oil should always be employed, but even this in very hot weather may be found to run rather on the thin side. It is a simple matter to thicken it, since all that is required is the addition of a little grease. Only a small quantity is needed.

\* In the "Farmer and Settler."

### AN INFORMATIVE JOURNAL.

*Thus a Shannon Brook (Casino, N.S.W.) reader:—"The Journal is just great; every page contains valuable information for some one."*

## COMPARATIVE POTATO TRIALS IN THE NORTH.

During the past season comparative trials with sixty-one varieties of potatoes were undertaken on the coastal area, the sixty-one varieties being planted at Woodstock, forty-one varieties at Pentland, twenty-four varieties at Bowen, and fifteen varieties at Ayr.

Unfortunately, an unprecedentedly heavy frost at Pentland and at Woodstock, and an attack of late blight at Bowen, rendered these trials of no comparative value, seed only being obtained therefrom.

At Ayr, where fifteen varieties were grown on the farm of G. S. McKersie, an excellent season was experienced, the following yields being obtained calculated as for one acre:—

Variety.	Smalls.				Saleable.				Total.			
	T.	C.	Q.	Lb.	T.	C.	Q.	Lb.	T.	C.	Q.	Lb.
Up-to-Date .. ..	1	10	1	5	7	5	0	26	8	15	2	23
Cook's Favourite .. ..	0	17	3	14	7	12	0	0	8	9	3	14
Arran's Comrade .. ..	1	9	1	0	6	16	3	23	8	6	0	23
Clark's Main Crop .. ..	2	5	2	26	5	18	3	16	8	4	2	14
Tasma .. ..	0	19	2	23	6	16	2	24	7	16	0	19
Scottish Triumph .. ..	1	15	0	7	5	17	0	0	7	12	0	7
Carmen .. ..	1	15	0	20	5	16	2	26	7	11	3	8
Trafalgar Carmen .. ..	2	7	2	8	4	18	0	5	7	5	2	13
Gold Coin .. ..	0	11	3	4	5	15	0	26	6	7	0	2
Arran Chief .. ..	1	2	3	5	4	17	3	8	6	0	2	13
Dalhousie .. ..	0	14	1	17	5	0	3	9	5	15	0	26
Templar .. ..	0	17	3	21	4	16	0	23	5	14	0	16
White Albino .. ..	1	1	0	12	4	2	1	17	5	3	2	1
Lochar .. ..	1	4	2	21	3	17	0	18	5	1	3	12
Queen of the Valley .. ..	1	5	3	20	3	9	0	16	4	15	0	8

With the exception of Queen of the Valley, the tubers of all the varieties were well shaped, free from blemish, and proved of good cooking quality. Samples of each, together with a table showing the yields of each were exhibited in a shop window in Ayr, attracting a great measure of attention.

The seed of these varieties was originally secured at Brisbane in 1925, sown on the Tableland as a summer crop in 1926, seed from this sown on the coast the same year, seed being returned to the Tableland for the summer crop in 1927, from which the seed was secured for this crop.

Seed from the coastal crops is to be tried again on the Tableland this summer, the seed of the best yielding varieties being brought to the coast for trial next year.

So far the yielding capacity of the potato has not been seriously affected when the seed has been saved in the tropics.—N. A. R. POLLOCK, Northern Instructor in Agriculture.

### THE JOURNAL APPRECIATED.

*B.M., Wynnum, writes (7/11/27):—"Your monthly Journal is very much appreciated; in fact, I put other reading matter aside until I have studied it."*



## FERTILISER EXPERIMENTS WITH PEANUTS.

By C. S. CLYDESDALE, Assistant Instructor in Agriculture.\*

In the course of the past few years peanut-growing has become an important industry in Queensland, and large areas, in the Kingaroy district mainly, are now being cultivated for the raising of this crop. With a view to obtaining data necessary to effectively carry on the industry, arrangements were respectively made with Messrs. B. Young, Memerambi, and J. Cavanagh, Wooroolin, for an area of land to carry out variety trials; also fertiliser and spacing tests. The soil is of red volcanic nature, the former plots being on forest, and the latter on scrub land. Both areas were typical of the class of country used for peanut-growing. Samples of soils were taken and submitted to the Agricultural Chemist.

### Field Trials.

Experiments with fertilisers and the spacing tests were carried out with the variety Red Spanish; and the variety trials with Red Spanish, White Spanish, and Virginia Bunch.

*Spacing Tests (Two Plots).*—Each plot one-tenth of an acre. Distance between rows, viz.:—2 feet 4 inches, 2 feet 8 inches, 3 feet, with a single spacing between each plant of 12 inches.

*Variety Trials (One Plot).*—Each plot one-tenth of an acre. Distance between rows, viz.:—2 feet 8 inches, with a single spacing between each plant of 12 inches.

A separate plot of Virginia Bunch was also sown, seed of which was obtained from E. Vesburg, Adelaide River, via Darwin, Northern Territory.

*Fertiliser Tests (One Plot).*—Each plot one-tenth of an acre. These plots were planted according to the local district standard, 2 feet 8 inches between the rows, with the plants spaced 12 inches apart. Ten plots, viz.:—

1. Unfertilised.
2. 200 lb. Nauru super mixture per acre.
3. 200 lb. Nauru super mixture per acre.  
80 lb. Muriate of Potash per acre.  
1,000 lb. Lime per acre.
4. 400 lb. Nauru super mixture per acre.  
160 lb. Muriate of Potash per acre.  
1,000 lb. Lime per acre.
5. 1,000 lb. Lime per acre.
6. Unfertilised.
7. 80 lb. of Muriate of Potash per acre.
8. 200 lb. of Nauru super mixture per acre.  
80 lb. of Muriate of Potash per acre.
9. 65 lb. of Nitrate of Soda per acre.  
200 lb. of Nauru super mixture per acre.  
80 lb. of Muriate of Potash per acre.
10. Unfertilised.

Previous to planting the lime was slacked and applied, followed by the broadcasting of the respective fertilisers allotted to each individual plot.

### Planting.

The planting was carried out on the 27th November on Mr. B. Young's farm, and 28th and 29th December on Mr. J. Cavanagh's, with the ordinary two-row planter, and seed sown at the rate of 25 lb. per acre. The Virginian Bunch variety, which was low in germination and was sown at the rate of 35 lb. per acre, had to be planted by hand owing to the kernels being too large for the plates in the machine.

Germination throughout all plots was very fair, with the exception of the Virginia Bunch variety which was poor, and necessitated replanting in the missed spaces.

The plots generally made good growth, and compared very favourably with other crops in the immediate vicinity.

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\*In the Annual Report, Department of Agriculture and Stock, Q.

**Harvesting and Threshing.**

Harvesting of the plots was carried out on the 9th and 10th May. All plots at both centres did remarkably well, producing a good quality nut.

Threshing was carried out at Mr. B. Young's farm, and the following yields were obtained:—

**FERTILISERS TESTS (RED SPANISH).**

Plot No.							Yield per Acre.		
							Cwt.	qr.	lb.
1	..	..	..	..	..	..	5	3	26
2	..	..	..	..	..	..	7	1	18
3	..	..	..	..	..	..	7	2	0
4	..	..	..	..	..	..	8	0	4
5	..	..	..	..	..	..	7	0	6
6	..	..	..	..	..	..	7	0	26
7	..	..	..	..	..	..	7	2	10
8	..	..	..	..	..	..	8	0	4
9	..	..	..	..	..	..	8	3	20
10	..	..	..	..	..	..	7	0	16

**SPACING TESTS (RED SPANISH).**

Plot No.	Distance between Rows.					Yield per Acre.		
						Cwt.	qr.	lb.
1	..	..	..	..	2 ft. 4 in.	..	7	1 18
2	..	..	..	..	2 ft. 8 in.	..	6	3 4
3	..	..	..	..	3 ft. 0 in.	..	5	1 2
4	..	..	..	..	2 ft. 4 in.	..	7	3 2
5	..	..	..	..	2 ft. 8 in.	..	7	0 26
6	..	..	..	..	3 ft. 0 in.	..	6	0 18

**VARIETY TESTS.**

Plot No. X.	Variety.							
1	..	..	..	..	Red Spanish	..	6	2 12
2	..	..	..	..	White Spanish		6	2 2
3	..	..	..	..	Virginia Bunch		8	1 16
Virginia Bunch (Darwin)					..	..	9	3 0

The plot of Mr. J. Cavanagh had not been threshed at the time of writing.

**WHEAT IMPROVEMENT.****FIELD WORK OF THE DEPARTMENT.**

By C. S. CLYDESDALE, Assistant Instructor in Agriculture.\*

The wheat improvement work of the Department in relation to the breeding and evolving of new varieties to suit Queensland conditions is gradually exerting a beneficial effect; there is also a slight increase in the area cropped this season.

Growers generally have also kept themselves right up to date in the matter of modern labour-saving machinery, and a marked improvement has taken place in methods of cultivation and in varieties now cultivated.

Notwithstanding certain disabilities which farmers in different localities experienced in the course of the past season, there is every reason for optimism as to the future of wheat-growing in Queensland.

\* In the Annual Report of the Department of Agriculture and Stock, Q.



It is pleasing to note that several varieties raised at Roma State Farm have again shown out prominently. A crossbred Cx B2d x Gluyas No. 2, now named "Duke of York," did remarkably well in the Cunningham district, when grown under similar condition, alongside of standard varieties.

This variety was first tried out in the Allora district three years ago, in single drills, and gave excellent promise in the way of resistance to rust, toughness of straw, power to hold grain, and high-yielding capacity; it should, therefore, become very popular. The following year this variety was tried out again on a small field area, and once more gave good promise. Last season, a propagation plot of 5 acres was planted, and yielded a good return of fair quality grain.

Wheat propagation plots and variety trials were carried out on the farms of Messrs. H. C. Murray, Southbrook; W. A. Lyell, Bony Mountain; E. Rowlings, Inglewood; and Geitz Brothers, Allora.

These trials represent a continuity of the work carried out each year. The system in vogue is the testing out of Roma crossbred wheats, under field conditions, the elimination of any undesirable varieties from the small plots, and extending suitable and proved varieties.

The results obtained from the variety trials and propagation plots were generally very satisfactory, and additional supplies of seed which complied with the Department's somewhat exacting requirements were secured.

### **Seed Wheat Improvement Scheme, 1926 Season.**

In connection with the seed wheat improvement scheme which was introduced by the Department of Agriculture, and accepted by the State Wheat Board for the purpose of raising pure supplies of seed wheat (which include 60 per cent. of Departmental varieties), an active campaign has been initiated in association with the Wheat Board. An itinerary of the principal wheat-growing districts, with the view to locating reliable growers to undertake the raising of pure strains of seed was arranged.

Special attention was given, when choosing sites for these plots, to the selection of individual varieties to meet the varying conditions of soil and environment under which wheat is produced. Observations made over an extended period point to the necessity on the part of the grower of selecting a limited range of varieties to permit of development under normal seasonal growth; and additionally, to ensure that the kinds chosen should be suitable in every way for the situation and particular class of soil on the farm where the respective varieties are to be grown. Depreciated yields are too often met with through inattention to factors of this character, which have a very direct bearing on the State's production. In a number of localities in the course of the past two seasons more land was brought under the plough. On the Oakey-Mount Russell line attention is being paid to the heavy black soil of the plains, which are very extensive; here one of the Roma crossbred wheats, "Warrior," did very well when grown under similar conditions to other varieties, and it is satisfactory to note that several growers in the immediate locality secured seed from last year's plot, with the intention of planting it this season. Similar instances may be cited respecting other wheat-growing areas where the Departmental wheats have come into favour.

At Acland, on rich friable scrub soil, "Cedric" has proved very reliable, and has taken the place of other varieties. These instances could be added to, and are recorded as illustrations of the effective functioning of the wheat-improvement scheme.

In the course of the present season (1927) arrangements were made for twenty-nine plots, comprising 240 acres with eleven varieties, viz:—Bunge No. 1, Pilot, Florida, Flora, Watchman, Waterman, Warrior, Cedric, Beewar, Noro, Amby.

### **Departmental Wheat Propagation Plots, 1927.**

Further arrangements have been made with Messrs. Geitz Brothers, Allora; W. A. Lyell, Bony Mountain; E. C. Stewart, Jandowae; and E. Rowlings, Inglewood; for the continuation of the variety trials during the coming season. At each centre 150 Roma crossbred wheats and a few standard varieties, also several varieties of barley were planted. Sowing was carried out as follows:—Jandowae and Allora, 8th and 9th June; Bony Mountain, 10th June; Inglewood, 13th June.

Good rain was experienced on the 3rd and 4th June at all centres, ranging from 70 points to 210 points. Satisfactory germination was assured. Further rain again fell on the 17th June, which gave the young plants an excellent start.

In addition to these trials, an extension of the wheat propagation plots was arranged for the purpose of increasing the area under the new "Duke of York" variety. Plots were established in the following districts:—

Name of Grower.					Area.	Date Sown.
					Acres.	1927.
Noller Bros., Oakey	..	..	..	..	5	10th June
E. Rowlings, Inglewood	..	..	..	..	10	25th May
W. A. Lyell, Bony Mountain	..	..	..	..	11	11th June
E. C. Stewart, Jandowae	..	..	..	..	6	10th June
J. and F. Noller, Kumbia	..	..	..	..	5	24th June

PASPALUM PASTURE RENOVATION.

PROGRESSIVE REPORT ON EXPERIMENTS.

By C. S. CLYDESDALE, Assistant Instructor in Agriculture.\*

The two plots which have been established at Maleny and Cooroy go to prove that the ploughing-up of the old root-bound paspalum pastures is undoubtedly the quickest way of giving them new life.

This was very noticeable when cuttings were made, by the quantity and quality of grass harvested. In addition to the enclosed squares established in the centre of each plot, control areas B and C were marked out, and cuttings were made at the same time as the enclosed squares for comparison purposes. Cutting commenced on the 11th November, 1926, and continued each month until April, 1927.

Following are the rainfall figures for both localities:—

Month.					COOROY.		MALENY.	
					Wet Days.	Points.	Wet Days.	Points.
1926.								
July	..	..	..	..	6	83	2	133
August	..	..	..	..	3	16	..	..
September	..	..	..	..	30	774	8	584
October	..	..	..	..	3	152	2	108
November	..	..	..	..	3	162	1	38
December	..	..	..	..	18	2,033	15	2,631
1927.								
January	..	..	..	..	22	2,839	17	3,877
February	..	..	..	..	12	553	6	390
March	..	..	..	..	23	1794	22	2,239
April	..	..	..	..	8	504	8	785
May	..	..	..	..	1	19	1	12
June	..	..	..	..	7	297	5	364
Totals					136	9,226	87	11,161

\* In the Annual Report of the Department of Agriculture and Stock, Q.



The following list gives details of the individual and aggregate weights of green grass cut from each individual plot:—

Cooroy.

1924-1925.		1925-1926.		1926-1927.		1926-1927.	
Plot No. Un- ploughed Area.	Plot No. Un- ploughed Area.	Date of Cuttings—		Date of Cuttings—		Date of Cuttings—	
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Maleny.

1924-1925.		1925-1926.		1926-1927.		1927.	
Plot No. Ploughed Area.	Plot No. Un- ploughed Area.	Date of Cuttings—		Date of Cuttings—		(CONTROL AREAS.	Date of Cuttings—
		25-2-25, 15-6-25.	20-10-25, 23-11-25, 17-12-25, 18-1-26, 18-2-26, 23-3-26, 22-4-26.	12-11-26, 10-12-26, 13-1-27, 11-2-27, 16-3-27, 27-4-27.	13-1-27, 11-2-27, 27-4-27.		
		Aggregate Weight per Cutting per Acre.	Total Weight of Grass.	Aggregate Weight per Cutting per Acre.	Total Weight of Grass.	Plot No. Ploughed.	Plot No. Un- ploughed.
		Tons.	Tons.	Tons.	Tons.		
1	..	2.13	4.26	1.65	11.57	1B	..
..	1A	1.40	2.81	.65	4.58	..	1C
2	..	2.23	4.47	2.03	14.19	2B	..
..	2A	1.91	3.82	.51	4.19	..	2C
		Only one cutting was made.					
3	..	3.11		1.79	12.42	3B	..
..	3A	3.87		.81	5.70	..	3C
4	..	2.48		1.84	12.91	4B	..
..	4A	3.14		.99	6.99	..	4C
		owing to damage by stock					
5	..	2.62	5.25	1.81	12.65	5B	..
..	5A	2.60	5.21	.96	6.72	..	5C
6	..	2.73	5.47	2.29	16.00	6B	..
..	6A	3.50	7.00	1.35	9.42	..	6C
7	..	3.04	6.09	1.89	13.20	7B	..
..	7A	2.90	5.81	.80	5.59	..	7C
8	..	4.24	8.48	2.09	14.61	8B	..
..	8A	2.36	4.73	.72	5.08	..	8C
7BB	..	..	..	2.27	15.93	..	..
8BB	..	..	..	2.33	16.31	..	..



SKETCH PLAN AND DETAILS OF MALENY PLOTS.—AREA, 2 ACRES.

Unploughed, 1A to 8A inclusive.		Ploughed, 1 to 8 inclusive.	
8A	Basic Super. 1½ cwt. per ac.		Basic super. 1½ cwt. per ac. 8
7A	Nitrate of soda 1½ cwt. per ac. Nauru phosphate 1 cwt per ac. Sulphate af potash 1½ cwt. per ac.		Nauru phasphate 1 cwt. per ac. 7 Sulphate of potash 1½ cwt. per ac. Nitrate of soda 1½ cwt. per ac.
6A	Nauru phosphate ¾-cwt. per ac. Superphosphate 3 cwt. per ac.		Nauru phosphate ¾-cwt per ac. 6 Superphosphate ¾-cwt. per cwt.
5A	Control. No manure.		Control. 5 No manure.
4A	Nauru phosphate 1 cwt. per ac.		Nauru phosphate 1 cwt. per ac. 4
3A	Slacked lime ½-ton per ac.		Slacked lime ½-ton per ac. 3
2A	Pulverised lime ¾-ton per ac.		Pulverised lime ¾-ton per ac. 2
1A	Control No Manure.		Control. 1 No manure.



Intersections of plots enclosed with wire-netting-covered stock-proof hurdles.

## Answers to Correspondents.

### Sensitive Plant.

INQUIRER (Aitape, New Guinea)—

Mr. H. T. Easterby, the Director of the Bureau of Sugar Experiment Stations, advises that arsenical sprays have been used with some measure of success on the Sensitive Plant in Queensland. As, however, this plant makes an excellent green manure for sugar-cane, it is very often ploughed under. In some analyses that were carried out at the Mackay Sugar Experiment Station it was found to contain 276.86 lb. of nitrogen per acre in a 15-ton crop, which was equivalent to a dressing of 1,384 lb. of sulphate of ammonia. It also contains large quantities of lime potash and phosphoric acid.

### The Use of Sulphate of Iron.

H.F.S. (Dalveen)—The Senior Analyst advises as follows with reference to your inquiry regarding the use of sulphate of iron:—

Sulphate of iron, upon decomposing, liberates sulphuric acid, which produces scorching; for this reason lime is usually used at the same time when spraying with ferrous sulphate. I have no record of spraying apple-trees with ferrous sulphate alone, but one European authority states that young vine leaves must not be sprayed with strong solution of this substance. Therefore in this hotter climate it certainly would be safer to experiment with a weak solution, and it is suggested that you try spraying (not heavily) one tree or portion of one tree with a solution of iron sulphate in the proportion of 1 lb. sulphate to 40 gallons of water and note the effect whether harmful or otherwise.

### Weeds on Lawn and Garden Paths.

J.S.C. (Brisbane)—The Senior Analyst advises:—

- (a) *Clover on Lawn*.—The best means of eradicating clover without appreciably damaging the lawn grass. *Reply*: Sulphate of Ammonia is effective, besides acting as a tonic to the grass.
- (b) *Weeds in Garden Paths*.—The best means of extirpating weeds on a gently sloping garden path with a brick border on either side. A bouganvillea hedge flanks the pathway. *Reply*: Strong brine solution made with common butcher's salt. It is safer than arsenic.
- (c) *Nut Grass in Garden Paths*.—Is it possible to check appreciably this growth by the application of the specific recommended for (b)? *Reply*: Yes, but not permanently.

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### BOTANY.

The following replies have been selected from the outgoing mail of the Government Botanist, Mr. Cyril White, F.L.S.:—

### Native Quinine.

T.A.P. (Toowoomba)—

Your specimen of small tree from the Warwick district is a native Quinine or Bitter Bark, *Alstonia constricta*. The bark contains the alkaloids alstonine, alstonidine, porphyrine, and porphyroisine. The bark is (or was) included in the Pharmacopœia.

### *Erythraea australis*—*Monstera deliciosa*.

T.H.B. (Kinleymore, via Murgon)—

The plant you enclose is *Erythraea australis*. A decoction made from it is sometimes used as a tonic. The fruit you mention is *Monstera deliciosa* (Mon-ster-a de-lici-osa).

### Nut Grass.

W.B. (Yarraman)—

The specimen is the common Nut Grass, *Cyperus rotundus*. It is a very serious pest in cultivation, and if there are only a few plants in your ploughed paddocks it would be advisable to dig them out and destroy them.



*The following reply has been selected from the outgoing mail of the Assistant Botanist, Mr. W. D. Francis:—*

### **“Red Head” or “Red Cotton Bush.”**

A.J.G. (Inkerman, N.Q.)—

Your specimen is known as Redhead or Red Cotton Bush, *Asclepias curassavica*. It is reputed to be poisonous to stock, and may be the cause of the death of your cattle. In many cases we have noticed that cattle in ordinary seasons avoid this plant. If you find that your cattle are eating the plant to any extent it would be advisable for you to cut it down or dig it out if practicable.

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### **PIG RAISING.**

*Replies selected from the outward correspondence of the Instructor in Pig Raising, Mr. E. J. Shelton:—*

#### **Paralysis in Pigs.**

W.B. (Mapleton)—

Tick (“bush” tick) paralysis in pigs is not uncommon. The first thing to do is to cut the ticks away with a sharp razor. Do not attempt to pull or tear the tick out, for, by so doing, you may force more of the poison into the pig’s body. Follow the advice contained in the leaflets forwarded. It is not usual for cattle ticks to infest pigs, but the common bush tick will fasten itself on to pigs in much the same way as it does on to dogs, and results are much the same. Some of the Pig Club children have noticed that bush ticks are more plentiful in paddocks where blady grass and similar growths exist. Blady grass, as you are aware, is of little or no value as stock feed, hence no loss would be incurred in burning off patches of this grass.

#### **Sick Pigs.**

H.W.H. (Nikenbah)—

It is evident that the sow died from pneumonia. The fact that she suffered from severe spasms of pain and had great difficulty in breathing, indicates clearly that her lungs were badly affected. Your references to the post-mortem examination also confirms the above statements, and we agree it was evident the trouble was not due to improper foods.

If the boar is still sick we advise a good course of opening (purgative) medicine. Give a good bran mash fed warm as the first feed of the day after he has been without food for twelve hours or more. Add just sufficient salt to this mash to give it a very slight flavour and give at about the consistency of thick cream. To the mash prepared as per details given in pamphlet on “Administration of Medicines to Pigs” (page 276), add 4 fluid ounces of castor oil. Repeat this the following day if his bowels have not been relieved, and compel him to take regular exercise even if it means driving him about for a while each day.

Fresh green food such as green lucerne, clover, succulent grasses, &c., might tempt his appetite, while he should have an abundant supply of drinking water. It is useless attempting treatment unless this is followed by a general improvement in the conditions under which the pigs are kept. One would be inclined to think your pig sty accommodation is at fault.

#### **Making Pigs Pay.**

T.B. (Finch Hatton, Mackay)—

1. You are correct. In order to make pigs a payable proposition, it is necessary to utilise such farm-grown foods as is possible, for there is little or no profit in the business if the food has to be purchased from outside sources; although it is agreed that there are times when it pays to purchase a certain quantity of concentrates which cannot be produced profitably on the farm.
2. As to the yield of pumpkins per acre, it is difficult to state definitely the weight per acre that might be expected from any given area. A really good crop might produce from 20 to 30 tons per acre, while if conditions are generally unfavourable, the return might be very small.
3. It is not a commercial proposition to store pumpkins in underground pits, the same way as turnips, &c., are pitted in other countries, for they will not keep for any great length of time in that condition. Storing them in a

clean, dry barn in which there is a fairly good draught of cool air, giving them plenty of room, and regularly inspecting them and picking out any that are decaying, appears to be the only way in which they can be successfully stored. Even then, careful handling is very necessary.

4. No definite experiments have been carried out in Australia, as far as we are aware, on feeding pigs entirely on ensilage made from the crops to which you refer. Ensilage may, however, be fed satisfactorily to bacon pigs, breeding stock and so on, in just the same way as lucerne hay may be fed. Under ordinary farm conditions, it would not pay to go to the expense of preparing ensilage especially for the pigs, for the reason that they much prefer fresh, succulent green foods and root crops. It certainly pays to feed ensilage if the crop is being prepared for other stock as well as for the pigs. It also pays to store lucerne hay, particularly for the breeding sows. It also pays to grow as many crops as it is possible to grow and to store grain for use during winter time and during other periods when milk and similar foods are in short supply. Fish meal is not available on the markets of Australia, for the reason that there has been no call for this particular meal here. We are, of course, aware that it is used extensively in England and in many other countries overseas. Several brands of meat meal, protein meal, &c., are, however, available, and we send you particulars of some of these. The firms manufacturing these products advertise extensively. You will find several advertisements in the "Queensland Agricultural Journal" that are well worth your study.
5. Price per pound live and dressed weight which one might expect for the pigs when they are ready for the butcher or bacon factory—we are forwarding current price lists, from which you will note that the general average on a dressed weight basis at the present time is about 7d. to 7½d. per lb., with 8d. per lb. as the top price for prime quality pigs of correct weight. These matters have all been dealt with in this Journal, extracts from which have been posted. It is our aim to render all the assistance possible to those who are interested in the industry.



PLATE 180.—STRAWBERRY AND TOMATO EXPERIMENTAL PLOTS ON MR. F. W. WORT'S FARM, RABY BAY, CLEVELAND.

Both plots were top-dressed with Nitrate of Soda before the first of the Spring rains.



## General Notes.

### Staff Changes and Appointments.

The Officer in Charge of Police at Richmond has been appointed Acting Inspector of Stock, as from 1st November, 1927.

### The Armistice Anniversary.

The ninth anniversary of the signing of the Armistice was commemorated appropriately throughout the State on 11th November. In the capital a great concourse assembled in front of the Post Office, where occasional addresses were delivered. His Excellency the Governor (Sir John Goodwin), in addressing the gathering, said the fact that they were present on the occasion was due to the self-sacrifice and heroism of those men whose memory they were honouring. The bodies of those men lay all over the world, but their memories remained for all time. "It is an honour for us to meet on this day of the year," added His Excellency, "in order to pay a short tribute of reverence and respect to the memories of those gallant men who gave everything they had, and to whom we owe all that we possess—our lives, our prosperity, our country, and our Empire. That is the debt we owe them, and we respect and reverence their memory."

The Acting Premier (Mr. W. Forgan Smith) said he felt it an honour to represent the Government on such an occasion. It was an occasion on which they indulged in some introspection. It was a time when they paid their grateful tribute to those who did so much for the Empire to which they all belonged. They were celebrating the Armistice—the dawn of peace after the greatest war that the civilisation of the world had ever known. It was their duty to hold in grateful remembrance all those men and women who took part in it, and those who sacrificed everything. "It is our duty also," he added, "to consider whether we are worthy of what has been done. The great principles of heroism, service, and sacrifice which constituted the spirit of Anzac are required to deal with the problems of peace. It is our duty to see to it, as citizens of this great Commonwealth, that everything is done that is humanly possible to perpetuate those principles in the life of the community. The problems of peace are always with us, but if we meet them with that spirit of service and self-reliance and courage that was manifested by the men and women who took part in the Great War, then we can say that their sacrifice was worth while, and that posterity will enjoy the benefit of it."

### Marketing Tomatoes.

A Regulation has been issued under the Fruit Marketing Organisation Acts to provide for the poll that is to be conducted upon the question of the proposed issue of a Direction that all tomatoes offered for sale or sold at Brisbane or Rockhampton on a wholesale basis (that is, in any other way than from a retailer or grower to a consumer), shall be done only by the Committee of Direction, its agents and servants, and by such other agents as shall observe the conditions set out by the Committee. These conditions provide that any grower of tomatoes may consign his tomatoes to any agent of his own choice for sale by such agent on the growers' behalf. The agent, however, shall, when instructed by the Committee, request growers not to send him consignments of C or B grade tomatoes, but which grades (C or B) if sent to any agent, notwithstanding instructions to the contrary, may be disposed of by the Committee to canners if found in suitable condition; but if not in suitable condition for canners' requirements will be disposed of at growers' expense. In the event of a grower sending C or B grades to an agent the latter to advise the Committee of Direction of Fruit Marketing.

This Direction is to remain in force for twelve months as from the 19th October, 1927.

The ballot-paper to give the growers concerned an opportunity of voting on the matter will be issued by the Committee of Direction, and must be returned to that organisation by not later than noon on the 15th December. Persons who have the right to vote are all growers who, during the twelve months prior to 20th October, 1927, had under cultivation at any one period an acre of tomatoes containing not less than 1,200 plants, and who had consigned tomatoes for sale on a wholesale basis to either the Brisbane or Rockhampton market during those twelve months, and whose intention it is to grow not less than one acre of tomatoes at any period during the ensuing twelve months, and who intend to consign tomatoes for sale on a wholesale basis to either Rockhampton or Brisbane markets during that period.

### Canary Seed Board.

The Minister for Agriculture and Stock (Hon. W. Forgan Smith) advises that the following nominations have been received for election as Growers' Representatives on the proposed Canary Seed Board:—Thomas Perse Grimes, Clifton; Thomas Muir, Allora; and Michael Coleman, Nobby. Two members will be required.

### Obituary.

The announcement of the death of Jessie Mary, the only daughter and youngest child of the Deputy Premier and Minister for Agriculture, the Hon. W. Forgan Smith, and Mrs. Forgan Smith, on 1st December, was received amid general expressions of profound regret. The little sufferer succumbed only after a brave struggle to live, and, in an effort to save her life, two transfusions of blood from her father were effected. It became sadly evident, however, that not even the father's sacrifice would avail. Little Miss Jessie was an exceptionally bright and winsome child, and the sympathy of the whole community goes out to the bereaved parents in their time of trial and overwhelming sorrow.

### The Quality of Queensland Bananas—Activities of "Geographical Protectionists."

When the Minister for Agriculture (Mr. W. Forgan Smith) was explaining in the House, a few days ago, the details of the Primary Produce Experiment Stations Bill, he mentioned that the banana industry is worth a little over £1,000,000 a year to the people of Australia. It is a white man's industry, and is capable of great expansion. Unquestionably Queensland can produce all the bananas that can be consumed in the Commonwealth by many times the present population. It is interesting, therefore, to note that the geographical protectionists of Melbourne are strenuously endeavouring to revive the Fiji banana industry. We are told that negotiations have been opened up with the Fiji Government; that the natives are to be encouraged to plant on a large scale; and that special steamers are to be purchased for the carriage of the fruit. To a very large extent the growers in Queensland are responsible for this effort to revive their most dangerous competitor. Mr. Forgan Smith admitted in his speech in the House that inferior bananas had been sent to the Southern markets, and he laid down the sound principal that when a Government gives protection to an industry it is the moral responsibility of those engaged in that industry to provide both quantity and quality of the product as required. Under the new Bill, when it becomes law, the Government will be able to prevent careless and indifferent growers from damaging a market that has been built up with great difficulty, and it is to be hoped it will exercise that power. If we are to retain the duty we must supply the quality of the banana that the Southern markets demand.—A "Brisbane Courier" editorial.

### Scientists Needed.

When discussing in the Legislative Assembly the growth of the banana industry, Mr. Frank Bulcock, the representative for Barcoo, paid a well-deserved tribute to the work of the agricultural scientists, claiming that the success of agriculture in the Commonwealth had been due to their assistance. This is an exceedingly important fact, and one too frequently overlooked; it is satisfactory, therefore, to find a member of the Ministerial party, and especially the representative of a pastoral constituency, taking the long national view regarding agriculture, and telling the House that the scientists are deserving of greater recognition. Now that a Chair of Agriculture has been established at the University, under the control of Professor Goddard, who has done so much to bring the results of the researches of the University into the homes of the farmers, we hope that Queensland will be able to train its own plant pathologists at no distant date, and all the other experts whose services will become increasingly important within a few years. In a State like Queensland, where the costs of production are much higher than in most of the other producing countries of the world, it is necessary that every opportunity shall be given to the producers to enable them to keep down the costs and to eliminate unnecessary waste. However much we may hope from the development of our secondary industries, we must keep the national perspective, and realise that Queensland is, essentially and fundamentally, a country of primary production. It is on that that our future prosperity rests.—From a "Brisbane Courier" editorial.



### Northern Pig Board.

The Minister for Agriculture and Stock (Mr. W. Forgan Smith) advises that the following nominations have been received for election as members of the Northern Pig Board:—Robert Thomas Croker, Malanda; David Johnston, Malanda; Frederick Henry Hyde, Pearamon; Robert Campbell, Pearamon; and Hugh Quinn, Pearamon. As five members are only required, no election will be necessary.

### The Dutch Egg Industry.

Down to the year 1907 Holland was an egg-importing country, but since then she has entered the ranks of the exporters to England and Germany, and the quality of her eggs has steadily improved year by year. The bulk of the eggs are sold to private dealers at the weekly markets, and one bad consequence of this is that eggs are to some extent held back at certain seasons of the year.

The big egg market at Barneveld, about 10 miles from the town of Amersfoort, is particularly interesting, being in the centre of one of the best egg-producing districts. The number of eggs marketed weekly is often about 3,000,000 at the Roommond market, 2,000,000 at Arnhem, between 25,000 and 500,000 at Barneveld (according to the season), and from 20,000 to 400,000 to Amersfoort. The eggs are candled, sorted, and packed at once; the brown eggs are all sent to England, and the white eggs to Germany. Eggs destined for England are despatched, if possible, on the same day to Rotterdam, and shipped that evening via Harwich to London; other consignments go to Hull and Leith.

Much of the credit for the progress made is due to the Dutch Poultry Organisation Society (locally known as the "V.P.N."), which has some 58,000 members, and a branch in every province, embracing some hundreds of local societies. Payment of the subscription entitles members to send eggs and poultry both to the local egg society and to the big egg markets, where 25 per cent. of the entire production is sold. Members stamp their own numbers and that of their society upon the eggs; fines are imposed upon members who send in inferior eggs. The candling apparatus used enables from 5,000 to 6,000 eggs to be tested every hour.

### Experimental Consignment of Australian Oranges.

Interest attaches to an experiment made with a cargo of 235 cases of South Australian oranges shipped to Great Britain by the "Bendigo." Excluding six cases in various wrappers, which were sent for special investigation by Dr. Barker, of Cambridge University, half of the cargo was carried in cold chambers, and the balance under ordinary cargo conditions between decks, without even a through draft. In appearance and condition there was no difference between the two lots, but on being tasted, those carried in cold store showed a fuller and finer flavour. The wastage was  $1\frac{1}{2}$  per cent. on large fruit, and none on the smaller fruit. The results are considered excellent, and were unexpected, says the "Imperial Food Journal."

### The Royal Society of Queensland—Abstract of Proceedings.

The ordinary monthly meeting was held in the Geology Lecture Theatre at the Queensland University on Monday, 31st October, 1927.

The President, Professor E. J. Goddard, was in the chair.

Dr. L. Bagster exhibited two blocks of slag showing large crystals, which were probably a silicate of calcium and iron. The specimens had been presented to the Geology Department by Mr. Boyd, of Mount Morgan. Comments were made by Messrs. F. Bennett and H. Tryon.

Dr. J. V. Duhig demonstrated the hæmolytic action of the venom of the dorsal spines of the common Stone Fish (*Synanceja horrida*), as a preliminary to a paper to be published later on the venom of this species. He showed three tubes—(1) washed guinea-pig red cells + *Synanceja* venom, sedimented, showing a marked zone of hæmolysis; (2) the same as the first, but shaken to show the hæmoglobin in solution; (3) red cells + saline solution showing no hæmolysis. Dr. Duhig also briefly explained the nearotrophic action of *Synanceja* venom, and demonstrated the poison sacs *in situ* on a dissected dorsal fin spine. The exhibit was commented on by Mr. F. Bennett and the President.

Mr. E. W. Bick exhibited an egg laid by a cassowary in captivity in the Botanic Gardens. This bird, when first brought to the gardens, had been considered an exceptionally fine specimen of a male by competent ornithologists. The President, in commenting on the exhibit, spoke of the relative frequency of occurrence of sex reversal in birds, and suggested the possibility in this instance. Dr. Duhig said that he had a hen at his home which had developed male characteristics.

Mr. W. D. Francis read a paper entitled, "The Rain-forest Flora of the Eungella Range." The rain-forest flora of the Eungella Range contains constituents of both the Southern and Northern rain-forests of the State. Its species constitution has evidently been influenced by the intermediate position of the area, the heavy rainfall (65 inches), and the elevation. The area contains some species which are identical with or allied to species abounding in mountain areas of Northern New South Wales, Southern and Northern Queensland, Papua, and Malaya. The paper was commented on by Messrs. Bennett, Bick, Tryon, Simmonds, Herbert, and the President.

Mr. D. A. Herbert read a paper on "Nutritional Exchange between Lianas and Trees." Small oval pieces of wood attached to rain-forest trees were found to be fused to the trunks. It was shown that these were the remains of woody vines which had rotted, leaving only small residual pieces of wood. It was contended that this was the result of the rotting away of other parts of the vine, the fungus not attacking the woody button so readily because of the presence of substances derived from the stem with which fusion had taken place. Specimens were exhibited showing stages in the formation of the buttons, one being noteworthy in showing the fusion of a dicotyledonous vine with a palm (*Archontophoenix Alexandræ*). The paper was commented on by Messrs. Tryon and Bennett.

### Central Cane Prices Board.

Following on the recent election, the Central Sugar Cane Prices Board has now been constituted for three years as from 13th November, 1927, as follows:—His Honour Mr. Justice W. F. Webb, Chairman; Messrs. T. A. Powell, Canegrowers' Representative; J. Smith, Millowners' Representative; J. M. MacGibbon, Qualified Sugar Chemist; and A. R. Henry, a person experienced in accountancy and audit. The only new member to the Board is Mr. John Smith, who succeeds Mr. B. R. Riley as Millowners' Representative. Mr. Smith, however, has had previous experience as a member of the Board.

### Tropical Fruits.

In the course of the debate on the second reading of the Primary Produce Experiment Stations Bill in the Legislative Assembly, the member for Bowen (Mr. C. Collins) complained of the lack of knowledge displayed by most persons with respect to the nutritive value of tropical fruits. One of the splendid fruits that his district was capable of producing in large numbers was the egg fruit, which was very appetising and nutritive if cooked properly. Another fruit which was grown in the North in large numbers was the granadilla, but this also was seldom seen in Brisbane. One of the things the experiment stations would have to do was not only teach the people how to grow fruit profitably, but how to acquire a taste for the locally-grown fruit. Even then it might be necessary, eventually, also to teach consumers how to cook the fruit to the best advantage, so that the dish would be appetising.

### The Celotex Industry—Its Potential Importance to Queensland.

It is the opinion of Mr. M. P. Campbell (who was a member of the Australian Industrial Delegation to the United States this year) that the use of celotex in home building will have a material effect on the comfort of homes in the tropical parts of Australia, making them more comfortable, enduring, and cool. Mr. Campbell, who is president of the Queensland Chamber of Manufactures, recently gave the Press an account of what he had seen as a visitor to the celotex factories in the United States. He said he thought the greater use of the product would help to settle the North of Queensland. In Chicago some members of the delegation spent half a day at the celotex laboratory, which was conducted entirely for research and experimental work in connection with the industry. They saw the product treated in thousands of different ways, in order to obtain varying effects. It was made to look like stone, cement, and rough cast, and some of the walls in the laboratory were covered with pictures, which had been painted directly on the celotex. Artists were permanently engaged in this class of work, and many beautiful designs and effects were secured. The laboratory also employed several physicists and research chemists, who were working ahead of requirements and looking towards the future of the industry. After leaving Chicago they discovered that celotex was used largely in every other city of America. They visited theatres, churches, offices, schools, and hospitals, and found they were fitted with acousti celotex, which had the property of absorbing sound. The Celotex company's engineers undertook to compute how much of this material was required to correct the acoustics of any room or place. Many new offices were installing it to deaden the sound of typewriters, and it was found to be of great



advantage, especially in schools and hospitals. At New Orleans they saw the celotex plant which made a lasting impression on the delegates on account of the way in which the machines were using up a hitherto almost useless waste product and converting it before their eyes into such useful material. The plant could best be described as a huge paper mill. The megas went in at one end, and was converted into pulp, squeezed, rolled, dried, and cut into sheets in a few minutes.

The finished product came out of the rolls at a comparatively fast rate, and was cut by ingenious devices, and then packed and placed aboard the railway trucks for despatch. It was remarkable that although 1,250,000 feet were turned out daily there was no accumulation of stocks, the demand being so great that the celotex was sent direct from the cutting table. The manufacture of celotex was contemplated in Queensland. In addition to converting a practically waste product into profitable material, it would divert the megas of the sugar industry from the furnaces, and thus stimulate the coalmining trade, transport, &c. Mr. Campbell showed a number of interesting photographs and fine examples of worked celotex, which he had brought home, the latter demonstrating the readiness of celotex to take paint, calcimine, and wallpaper, its adaptability to decoration by stencilling, and by a paint which produced a stucco effect, and its adhesive qualities as a base for plaster.

### Feeding Tests on Dairy Cows.

To determine the effect of succulent feeds on the flavour and odour of milk, and to ascertain the best methods for feeding such crops, the Department of Agriculture, United States of America, has announced the results of a series of tests conducted at one of its experimental farms. In a statement issued on 3rd August the Department says it used selected cows, whose milk was relatively free from abnormal flavours and odours after being fed on a hay and grain ration. The full text of the statement is as follows:—

“To determine whether dried beet pulp, green oats and peas, pumpkins, carrots, sugar beets, rape, soy beans, and kale when fed to dairy cows impart undesirable flavours and odours to the milk, and to ascertain the best methods of feeding such crops and handling the milk, the United States Department of Agriculture has conducted feeding tests at its experiment farm at Beltsville, Md.

“The cows selected for the investigations were giving milk relatively free from abnormal flavours and odours when fed a basic hay and grain ration, and varied in stage of lactation from those fresh to those nearing end of lactation period.

“Besides the succulent feed the animals received, in proportion to milk produced, varying quantities of the following grain mixture:—100 lb. each of hominy feed, bran, and oats, and 50 lb. each cotton seed meal and linseed-oil meal. In addition, they were given all the alfalfa hay they would readily consume. The cows were divided into groups of four each, and interchanged at intervals of four days.

“Dried beet pulp soaked and fed wet one hour before milking in quantities up to 30 lb. produced but a slightly abnormal flavour and odour in the milk. The same ration immediately after milking had no effect on its flavour or odour. Similar results followed the feeding of a like quantity of green oats and peas one hour before and after milking. Both kale and rape fed in similar quantities one hour prior to milking produced a decidedly abnormal flavour and odour in the milk, but had a negligible effect when fed afterward. Soy beans fed one hour before milking tended to improve the flavour and odour of the milk.”

Readers are reminded that a cross in the prescribed square on the first page of this “Journal” is an indication that their Subscription—one shilling—for the current year is now due. The “Journal” is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

## The Home and the Garden.

### THE BABY—ITS CARE AND FEEDING.

*The subjoined article is one of a series to be issued by the Queensland Baby Clinics, dealing with infant welfare. These notes have been written in the hope of improving the health and happiness of babies, and of reducing infant mortality to a minimum. In this connection it is an interesting fact that Australia's death rate is lower than that of any other country in the world, excepting New Zealand. Queensland's general death rate is below that of the rest of Australia, and in infant mortality both the State and Commonwealth bear very favourable comparison with other countries. Any further effort to save our babies—Australia's best "immigrants"—and keep the death rate down must meet with ready sympathy and arouse a desire to co-operate practically in the good work.—Ed.*

On the treatment and training which an infant receives in the first weeks of life depends greatly its progress during the ensuing twelve months. The opinion is frequently expressed that the new-born baby is too young to be trained; this is a mistake. Even very young babies quickly acquire habits, and it is important that they should be of the right kind.

To delay training until he is a few months old may, and probably will, result in giving mother or nurse a great deal of trouble, and the baby much unnecessary distress. So begin as you mean to go on.

The first bath should be performed quickly. The new-born infant is not yet used to his new surroundings, and is very easily chilled. For this reason, oil and bath him as quickly as you can; dress him, and see that he is warm and comfortable. He will probably be very drowsy and inclined to sleep for some hours. Newly-born infants should sleep more than three parts of their time, and, for the first few days, practically all the time they are not occupied with bathing and feeding.

From birth baby should have his own cot; he should never sleep with his mother. Not only is it healthier for him to sleep alone, but he sleeps better so. Some people think that the baby requires to sleep with his mother for warmth. This is a mistake. A healthy baby will, for most of the year, keep comfortably warm without any external heat other than that supplied by the bed-clothes on his cot. For the coldest months, if he is inclined to be chilly, his bed can be warmed with a hot water bag or bottle, carefully placed with the stopper or cork inclined downwards, so that there is no possibility of baby being burnt, even if the stopper or cork should accidentally come out. He should be accustomed from birth to sleep without a light. People who have had much experience with young babies notice that their sleep is more likely to be sound and undisturbed if there is no light in the room.

#### The Feeding of the Infant.

Now for the feeding of the new baby. This is a most important matter, and probably more mistakes are made on this than any other point in the management of infants.

Most babies when born know how to suck. It is seldom we find one who cannot do so. This is because, for long ages past, babies have been fed at their mother's breasts, and at birth the sucking instinct is present. This instinct must be developed, but care taken that it is done on the right lines. It must not be either under-developed or over-developed. If baby, who very often in these first days of life is very sleepy indeed, is allowed to sleep almost undisturbed, he may, at the end of a day or two, be very unwilling to work for his living. For that is what sucking is to a baby, and there is no more difficult child to manage than the one who has not been trained to suck properly. Feeding him from a feeding bottle, with the hole in the teat so large that the fluid pours down his throat without effort on his part, will also result in disinclination to suck.



The instinct can be over-stimulated by putting baby too frequently to the breast, or by leaving him there for too long a time. Also by giving him a dummy to suck constantly.

Vigorous sucking is necessary for his health, but it should be done regularly, and at proper feeding-time only. In the early months of life it forms a very important part of baby's daily exercise, for not only does it develop jaws and mouth, but it improves the circulation of the whole body.

There is another reason why baby should be trained to correct feeding habits early. We all know that the mother's full milk supply does not come in until the end of the second or the beginning of the third day after baby's birth. But before the milk comes in there is a little creamy-looking fluid in the breasts. This the baby should have, for, although there is very little, it has high food value, and at this time no other food can take its place. In addition, the mother's health also is benefited, and she makes a quicker recovery if baby is put regularly to the breast at this time.

Put baby to the breast within about six hours of birth—as soon as the mother has rested—leaving him only about two minutes at each breast. See that he is actually sucking, and not dozing. It will be sufficient to do this once every six hours for the first day. On the second day, leave him three or four minutes at each breast, and feed him every four hours. On the third day, when the milk supply is usually established, put him to the breast every three hours, and leave him about fifteen minutes. The average baby takes from fifteen to twenty minutes to feed. No baby should be left at the breast for longer than thirty minutes, and it is only delicate babies or those who suck feebly who should require so long.

Alternate the commencing breast; that is, if you begin by giving the baby the right breast for his first feed, commence with the left for the second, the right again for the third, and so on.

Big, strong babies generally do well if fed every four hours; that is, five feeds daily, from the third day. Others are better on three-hourly feeding (six feeds daily) until they are about three months old. After that time, four-hourly feeding suits most infants, but never jump suddenly from three to four-hourly feeding. Increase the intervals by a quarter of an hour every second or third day until a four-hourly interval is reached. This can be done without baby being aware that any change is being made. Give no night feeds from birth. This is most important. If this is done from the start of life, baby learns to take all that he needs in the day-time. This allows him and his mother to get the regular uninterrupted night's sleep which both require.

### **No Night Feeds.**

A baby trained from birth to have no night feeds takes, during the day, all he requires to satisfy his hunger, and for his growth and development. If fed in the day only, he obtains just as much as if he were being fed both day and night. For example, careful weighing of children before and after feeding has shown that a child having, say, 30 ounces of food in the twenty-four hours, and given six feeds a day, takes 5 ounces at each feed, while if he is fed ten times a day, he takes 3 ounces at each feed, thus obtaining exactly the same quantity of food in the twenty-four hours.

But this training must start at birth. A baby accustomed to being fed night and day will protest vigorously if his mother suddenly lengthens his feeding intervals. He has been trained to frequent feedings, so takes only sufficient to satisfy his hunger for that period. But when started from birth on regular three or four-hourly feeds, with no night feeds, he never expects anything else. So keep absolutely to regular feeding times; make no exceptions. To do so one day will almost certainly result in the baby demanding the same concession the next day. Never hesitate to wake baby during the day when feeding-time comes round. Very soon he will learn to wake himself at the right time. If he is allowed to sleep over his feeding-time during the day, he cannot be expected to sleep all night. He will not have had his full supply of food, so will be hungry and restless.

### **Natural Food only.**

One more very important point before closing. Mention has already been made of the fact that the mother's milk does not come in until the second or third day. As a result, many people think it their duty to give baby artificial food during this time. This is a great mistake, which can lead to much trouble, and in many cases has been responsible for the unnecessary weaning of the baby.

If baby required food during the first two days of his life Nature would supply it. The very fact that it is not there proves it to be unnecessary. As previously mentioned, baby needs the little fluid there is in the mother's breasts at that time, and should be put regularly to the breast to obtain it. Beyond this nothing but plain, boiled water should be given. Babies who are fed on sweetened water or condensed milk as their first food not infrequently refuse to take their natural food later. The reason is simple. Cane sugar, which sweetens both sugar and water and condensed milk, is very sweet. Mother's milk contains a different sugar, called sugar of milk; this is only faintly sweet. Babies like sweet things, and show their preference by refusing to take their proper food.

Important points to remember in feeding baby are:—

Commence training at birth.

Feed regularly; give no night feeds.

Wake baby when necessary during the day.

Make no exceptions.

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## KITCHEN GARDEN.

A first sowing of cabbages, cauliflower, and Brussels sprouts may now be made in covered seed bed, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering. Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflower, mustard, cabbage, celery, radish for autumn and winter use. Sow celery in shallow well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter are, however, unlikely to succeed except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; also garlic, onions, and eschalots as the tops die down.

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## FLOWER GARDEN.

To make the flower-beds gay and attractive during the autumn and winter months is not a matter of great difficulty. Prepare a few shallow boxes. Make a compost, a great part of which should consist of rotten leaves. Fill the boxes with the compost; then sow thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle, lift them gently one by one with a knife or a zinc label—*never pull them up by hand*, as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty of leaf mould. Keep a sharp lookout for slugs and caterpillars.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to over-water at this season. Propagate verbenas, not forgetting to include the large scarlet Fox hunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed-boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work, the flower garden in autumn and winter will present a charming sight.



## Orchard Notes for January.

### THE COASTAL DISTRICTS.

All orchards, plantations, and vineyards should be kept well cultivated and free from weed growth; in the first place, to conserve the moisture in the soil, so necessary for the proper development of all fruit trees and vines; and, secondly, to have any weed growth well in hand before the regular wet season commences. This advice is especially applicable to citrus orchards, which frequently suffer from lack of moisture at this period of the year if the weather is at all dry, and the young crop of fruit on the trees is injured to a greater or less extent in consequence.

Pineapple plantations must also be kept well worked and free from weeds, as when the harvesting of the main summer crop takes place later on, there is little time to devote to cultivation. If this important work has been neglected, not only does the actual crop of fruit on the plants suffer, but the plants themselves receive a setback.

Banana plantations should be kept well worked, and where the soil is likely to wash badly, or there is a deficiency of humus, a green crop for manuring may be planted. Should the normal wet season set in, it will then soon cover the ground without injury to the banana plants. When necessary, banana plantations should be manured now, using a complete manure rich in potash and nitrogen. Pineapples may also be manured, using a composition rich in potash and nitrogen, but containing no acid phosphate (superphosphate) and only a small percentage of bone meal, ground phosphatic rock, or other material containing phosphoric acid in a slowly available form.

Bananas and pineapples may still be planted, though it is somewhat late for the former in the more southern parts of the State. Keep a good lookout for pests of all kinds, such as Maori on citrus trees, scale insects of all kinds, all leaf-eating insects, borers, and fungus pests generally, using the remedies recommended in Departmental publications.

Fruit fly should receive special attention, and on no account should infested fruit of any kind be allowed to lie about on the ground to become the means of breeding this serious pest. If this is neglected, when the main mango crop in the South and the early ripening citrus fruits are ready, there will be an army of flies waiting to destroy them.

Be very careful in handling and marketing of all kinds of fruit, as it soon spoils in hot weather, even when given the most careful treatment. Further, as during January there is generally more or less of a glut of fresh fruit, only the best will meet with a ready sale at a satisfactory price.

Grapes are in full season, and in order that they may be sold to advantage they must be very carefully handled, graded, and packed, as their value depends very much on the condition in which they reach the market and open up for sale. Well-coloured fruit, with the bloom on and without a blemish, always sells well, whereas badly coloured, immature, or bruised fruit is hard to quit.

One of the greatest mistakes in marketing grapes is to send the fruit to market before it is properly ripe, and there is no better way to spoil its sale than to try and force it on the general public when it is sour and unfit to eat.

Bananas for sending to the Southern States require to be cut on the green side, but not when they are so immature as to be only partially filled. The fruit must be well filled but show no sign of ripening; it must be carefully graded and packed and the cases marked in accordance with the regulations under the Fruit Cases Acts and forwarded to its destination with as little delay as possible.

Pineapples should be packed when they are fully developed, which means that they contain sufficient sugar to enable the fruit to mature properly. Immature fruit must not be marketed, and if an attempt is made to do so the fruit is liable to seizure and the sender of the fruit to prosecution under the abovenamed regulations. Further, the fruit must be graded to size and the number of fruit contained in a case must be marked thereon. Immature fruit must not be sent. For canning, the fruit should be partly coloured; immature fruit is useless; and overripe fruit is just as bad. The former is deficient in colour and flavour and the latter is "winey" and of poor texture, so that it will not stand the necessary preparation and cooking.

Should there be a glut of bananas, growers are advised to try and convert any thoroughly ripe fruit into banana figs.

The fruit must be thoroughly ripe, so that it will peel easily, and it should be laid in a single layer on wooden trays and placed in the sun to dry. If the weather is settled, there is little trouble, but if there is any sign of rain the trays must be

stacked till the weather is again fine, and the top of the stack protected from the rain. To facilitate drying, the fruit may be cut in half lengthways. It should be dried till a small portion rubbed between the finger and thumb shows no sign of moisture. It can be placed in a suitable box to sweat for a few days, after which it can be dipped in boiling water to destroy any moth or insect eggs that may have been laid on it during the process of drying and sweating. It is then placed in the sun to dry off any moisture, and when quite dry it should be at once packed into boxes lined with clean white paper. It must be firmly packed, when, if it has been properly dried, it will keep a considerable time. It can be used in many ways, and forms an excellent substitute for raisins, sultanas, currants, or other dried fruits used in making fruit cakes and other comestibles. Banana figs will be found useful for home consumption, and it is possible that a trade may be built up that will absorb a quantity of fruit that would otherwise go to waste.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

January is a busy month in the Granite Belt, and orchardists are fully occupied gathering, packing, and marketing the crop of midseason fruits, consisting of plums of several kinds, peaches, nectarines, pears, and apples. The majority of these fruits are better keepers and carriers than those that ripen earlier in the season; at the same time, the period of usefulness of any particular fruit is very limited, and it must be marketed and disposed of with as little delay as possible.

With the great increase in production, owing to the large area of new orchards coming into bearing and the increasing yields of those orchards that have not come into full profit, there is not likely to be any market for immature or inferior fruit. There will be ample good fruit to fully supply the markets that are available and accessible. Much of the fruit will not carry far beyond the metropolitan market, but firm-fleshed plums, clingstone peaches, and good firm apples should stand the journey to the Central, and, if they are very carefully selected, handled in a manner to prevent any bruising, and properly graded and packed, they should carry as far as Townsville. Growers must remember that, given a market fully supplied with fruit, only such fruit as reaches that market in first-class condition is likely to bring a price that will pay them; consequently the grower who takes the trouble to send nothing but perfect fruit, to grade it for size and colour, to pack it carefully and honestly, placing only one sized fruit, of even quality and even colour, in a case and packing it so that it will carry without bruising, and, when opened up for sale, will show off to the best advantage, is pretty certain of making good. On the other hand, the careless grower who sends inferior, badly graded, or badly packed fruit is very likely to find when the returns for the sale of his fruit are to hand, that after paying expenses there is little, if anything, left. The expense of marketing the fruit is practically the same in both cases.

Then "why spoil the ship for the ha'p'orth of tar" after you have gone to the expense of pruning, spraying, manuring, and cultivating your orchard? Why not try and get a maximum return for your labour by marketing your fruit properly? The packing of all kinds of fruit is a fairly simple matter, provided you will remember—

- (1) That the fruit must be fully developed, but yet quite firm when gathered.
- (2) That it must be handled like eggs, as a bruised fruit is a spoilt fruit, and, when packed with sound fruit, spoils them also.
- (3) That only one-sized fruit, of an even degree of ripeness and colour, must be packed in a case.
- (4) That the fruit must be so packed that it will not shift, for if it is loosely packed it will be so bruised when it reaches its destination that it will be of little value. At the same time, it must not be packed so tightly as to crush the fruit.

If these simple rules are borne in mind, growers will find that much of the blame they frequently attribute to the fruit merchants or middlemen is actually the result of their own lack of care. Fruit that opens up in the pink of condition sells itself, whereas any fruit that opens up indifferently is hard to sell on any except a bare market, and on a glutted market is either unsaleable or realises such a poor price that the grower is frequently out of pocket and would have been better off had he not attempted to market it.

If spraying with arsenate of lead, and systematic bandaging, has been properly carried out, there will be comparatively few codlin moths to destroy the later ripening pip fruit; but if these essential operations have been neglected or carelessly carried out, a number of moths will hatch out and the eggs laid by them will turn to larvae that will do much damage, in some cases even more than that caused by the first broods that attack the fruit as soon as it is formed. Where there is any likelihood, therefore, of a late crop of moths, spraying with arsenate of lead must be continued if the late crop of pip fruits is to be kept free from this serious pest.



Fruit fly must be systematically fought, and on no account must any fly-infected fruit be allowed to lie about on the ground and breed this pest, to do further damage to the later ripening fruits.

Citrus orchards will need to be kept well cultivated in the drier and warmer parts of the State, and, where necessary, the trees should be irrigated. If scale insects are present, the trees should be either sprayed, or, better still, treated with hydrocyanic acid gas.

Western grapes are in full season, and if they are to be sent long distances by rail then they are all the better to be cut some hours before they are packed, as this tends to wilt the stems and keep the berries from falling off in transit. The fruit must be perfectly dry when packed, and should be as cool as possible. It must be firmly packed, as a slack-packed case always carries badly and the fruit opens up in a more or less bruised condition.

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## Farm Notes for January.

**FIELD.**—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole. Early-sown cotton will be in bloom.

On coastal and intercoastal scrub districts, where recently burnt-off scrub lands are ready for the reception of seed of summer-growing grasses, sowing may commence as soon as suitable weather is experienced. Much disappointment may be saved, and subsequent expenditure obviated, by ensuring that only good germinable grass seed is sown, of kinds and in quantities to suit local conditions, the circumstances being kept in mind that a good stand of grass is the principal factor in keeping down weeds and undergrowth.

In all districts where wheat, barley, oats, canary seed, and similar crops have recently been harvested, the practice of breaking up the surface soil on the cropped areas should invariably be adopted. Soil put into fit condition in this way will "trap" moisture and admit of the rains percolating into the subsoil, where the moisture necessary for the production of a succeeding crop can be held, provided attention is given to the maintenance of a surface mulch, and to the removal, by regular cultivation, of volunteer growths of all kinds. If not already seen to, all harvesting machinery should be put under cover, overhauled, and the woodwork painted where required.

Where maize and all summer-growing "hoed" crops are not too far advanced for the purpose, they should be kept in a well-cultivated condition with the horse hoe. Young maize and sorghum crops will derive much benefit by harrowing them, in the same direction as the rows are running, using light lever harrows with the tynes set back at an angle to obviate dragging out of plants, but the work should not be done in the heat of the day.

Quick-maturing varieties of maize and sorghum may still be sown in the early part of the month in coastal areas where early frosts are not expected.

Succession sowings may be made of a number of quick-growing summer fodder crops—Sudan grass, Japanese and French millet, white panicum, and liberty millet (panicum). In favourable situations, both "grain" and "saccharine" sorghums may still be sown; also maize, for fodder purposes.

Fodder conservation should be the aim of everyone who derives a living from stock, particularly the dairyman; the present is an important period to plan cropping arrangements. Exclusive of the main crops for feeding-off (when fodder is suitable for this purpose), ample provision should be made for ensilage crops to be conserved in silo or stack. As natural and summer-growing artificial grasses may be expected to lose some of their succulence in autumn, and more of it in winter and early spring, the cropping "lay-out" to provide a continuity of succulent green fodder throughout the season calls for thorough and deep cultivation and the building up of the fertility and moisture-holding capacity of the soil. Planter's friend (sorghum) may be sown as a broadcast crop at the latter end of the month for cutting and feeding to cattle in the autumn and early winter. Strips of land should be prepared also for a succession sowing about the second week in February, and for winter-growing fodder crops.

## TENDERS FOR LEASES of State Farms at Hermitage (Warwick) and Warren (Rockhampton).

**T**ENDERS are invited for the leases, as from the 1st February, 1928, of the Warren and Hermitage State Farms, for a period of five years, with a preference for a further three years.

The WARREN STATE FARM has a total area of 1,128 $\frac{1}{4}$  acres (approximately 200 acres under cultivation), is situated 17 miles from Rockhampton, and has a frontage of over a mile to the main railway line.

The area situated between the main line and the Westwood-Stanwell road (590 acres in extent) is divided into seventeen paddocks, watered by the Neerkoll Creek, also by a well from which water is pumped by a windmill to an elevated tank and reticulated to the various buildings, yards, and paddocks.

Improvements consist of the manager's house, men's quarters, reinforced concrete twin silos of 200 tons capacity, implement shed combined with storeroom and workshop, stables, loose-box and feedroom with horse yards attached, engine room, dairy cream room and milking shed, chaff room and large feeding shed filled with stalls, cow yard (portion concreted), and concrete dip with yards. Three bull stalls with exercise yards, substantial piggeries with concrete floors and troughs, exercise yards and shelter sheds, calf house with feeding bails and concrete floors, pig food-preparing shed also with concrete floor.

Additional to the above area there are two large grazing paddocks (approximately 360 and 179 acres) separated by a fenced road, situated on the south side of Westwood-Stanwell road, and watered by a well (40 feet), windmill, and 6,000 gallon tank with distributing pipe lines to three contiguous paddocks.

The whole of this property is substantially fenced and the improvements in a first-class state of preservation. The property generally is well suited for carrying on an up-to-date dairy and stud farm.

The HERMITAGE STUD FARM is 5 miles from the town of Warwick, on the main Killarney Railway. The property has a double frontage to the railway line and the railway station, and has an aggregate area of 430 acres, principally arable land, together with all crops growing thereon.

IMPROVEMENTS.—Manager's house (nine rooms, bath, and storeroom), modern barn silo, implement shed, hay shed, stallion box, stables, cartsheds and feed room with enclosed yards, smithy, dairy, cream room, milking shed with bull and calf stalls, men's cottage, sheep dip, draining yards, and shelter shed. The property is watered by a well, also a bore, from which water is lifted by windmills to elevated tanks and reticulated to the various paddocks, and the property has a frontage on its south side to Swan Creek. The area on the south side of the railway line (230 acres, divided into nine paddocks) is enclosed with a wire-netted boundary fence, whilst the major portion of that on the north (190 acres, divided into seven paddocks) is similarly fenced.

An inspection of both properties can be arranged by communicating direct with the Managers of the Farms concerned.

It is proposed to hold, about the middle of January, an auction sale of the stud and farm stock and the farming implements at both the Farms.

Forms of Tender may be obtained on application to the Managers of the Farms, and from the Department of Agriculture and Stock, Brisbane.

Tenders, which should be marked "State Farm Tenders," will close on 23rd December, 1927, and should be addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane, from whom any further particulars may be obtained.

The highest or any tender not necessarily accepted.

E. GRAHAM, Under Secretary,  
Department of Agriculture and Stock, Brisbane.



ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.						Phases of the Moon, Occultations, &c.	
AT WARWICK.						The times stated are for Queensland, New South Wales, Victoria, and Tasmania.	
						MOONRISE.	
Date.	December. 1927.		January. 1928.		Dec. 1927.	Jan. 1928.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.	
1	4.50	6.32	5.1	6.49	10.31 a.m.	12.32 p.m.	2 Dec. ☾ First Quarter 12 14 p.m.
2	4.50	6.32	5.2	6.49	11.34	1.35	9 " ○ Full Moon 3 32 a.m.
3	4.50	6.33	5.3	6.49	12.35 p.m.	2.40	16 " ☾ Last Quarter 10 3 a.m.
4	4.50	6.34	5.3	6.50	1.39	3 47	24 " ☉ New Moon 2 13 p.m.
5	4.50	6.35	5.4	6.50	2.42	4.54	31 " ☾ First Quarter 9 22 p.m.
6	4.50	6.35	5.5	6.50	3.49	5.57	Perigee 7th December, at 7 11 a.m.
7	4.50	6.36	5.6	6.51	4.56	7.0	Apogee 19th December, at 8 24 a.m.
8	4.50	6.37	5.6	6.51	6.6	7.54	In the early dawn on the 9th, near the eastern horizon, the planets Mercury and Mars may be observed to be in close conjunction, Mercury being about one degree northward of Mars. Before the Sun rises Saturn will also be over the eastern horizon, but quite unobservable.
9	4.50	6.37	5.7	6.51	7.15	8.45	
10	4.51	6.38	5.8	6.51	8.19	9.25	On 20th December, about 2 p.m., Venus will be near the southern or upper edge of the Moon as seen from Queensland. A pair of binoculars may be necessary to see Venus at such an hour in the day, but probably many keen eyes may detect it without them. Had it not been for the considerable declension of the brilliancy of Venus since 17th October, the daylight spectacle would have been a much more interesting one.
11	4.51	6.39	5.9	6.51	9.16	10.2	7 Jan. ○ Full Moon 4 7 p.m.
12	4.51	6.40	5.9	6.51	10.8	10.34	
13	4.51	6.40	5.10	6.51	10.52	11.3	15 " ☾ Last Quarter 7 13 a.m.
14	4.52	6.41	5.11	6.51	11.30	11.33	23 " ☉ New Moon 6 18 a.m.
15	4.52	6.41	5.12	6.51	...	...	30 " ☾ First Quarter 5 25 a.m.
16	4.52	6.42	5.13	6.51	12.4 a.m.	12.3 a.m.	Perigee 4th January, at 8 36 a.m.
17	4.52	6.43	5.13	6.51	12.35	12.34	Apogee 16th January, at 4 48 a.m.
18	4.53	6.43	5.14	6.51	1.3	1.9	Perigee 29th January, 9 30 p.m.
19	4.53	6.44	5.15	6.51	1.33	1.46	On the 4th, the Earth will reach that part of its orbit which is nearest the Sun. It will then be three million miles nearer to it than on the 4th July.
20	4.54	6.44	5.16	6.50	2.3	2.30	
21	4.54	6.45	5.16	6.50	2.36	3.20	The occultation of Omega Tauri by the Moon on the 4th soon after 7 p.m. may be fairly well observed in a telescope or binoculars at such positions as Rockhampton, Gympie, Maryborough, Brisbane, Warwick, and Toowoomba, although the twilight will somewhat interfere with the disappearance of the star on the dark edge of the Moon; at the time of reappearance about an hour later, at the bright side, the greater darkness will improve the effect.
22	4.55	6.46	5.17	6.50	3.13	4.15	On the 8th soon after 4 a.m. it will be interesting to watch the occultation of Kappa Geminorum by the Moon, with telescope or binoculars, at places as far south as Warwick, on account of its nearness to the southern edge of the Moon.
23	4.55	6.46	5.18	6.49	3.52	5.13	An unusually favourable opportunity to find the planet Neptune will occur on the 8th after about 10 p.m. The planet will be remarkably close to Regulus, the brightest star of Leo, which will rise about 9 p.m. about 12½ degrees (twice the length of the Southern Cross) north of east. Binoculars or telescope will be required to see Neptune, which appears as a very small star, below naked-eye visibility, its distance being over 2,700 million miles.
24	4.56	6.47	5.19	6.49	4.39	6.15	Mercury will be on the far side of its orbit, nearly behind the Sun on the 9th; two degrees above it at midday.
25	4.56	6.47	5.19	6.49	5.30	7.19	
26	4.57	6.47	5.20	6.48	6.25	8.22	
27	4.57	6.48	5.21	6.48	7.24	9.25	
28	4.58	6.48	5.22	6.48	8.25	10.26	
29	4.59	6.48	5.23	6.47	9.27	11.29	
30	5.0	6.49	5.24	6.47	10.28	12.32	
31	5.0	6.49	5.25	6.47	11.30	1.37	

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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